CALIFORNIA DESERT CONSERVATION AREA PLAN AMENDMENT / FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

FES-10-31

VOLUME II

JULY 2010

BLM

Needles Field Office

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

BLM/CA/ES-2010-010+1793

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Needles Field Office
1303 South U.S. Highway 95
Needles, CA 92363
www.ca.blm.gov/needles

In Reply Refer To:

In reply refer to:
1610-5.G.1.4
2800/CACA-48668

Dear Reader:

Enclosed is the proposed California Desert Conservation Area Plan Amendment and Final Environmental Impact Statement (CDCA Plan Amendment/FEIS) for the Ivanpah Solar Electric Generating System (ISEGS) project. The Bureau of Land Management (BLM) prepared the CDCA Plan Amendment/FEIS for the ISEGS project in consultation with cooperating agencies and California State agencies, taking into account public comments received during the National Environmental Policy Act (NEPA) process. The proposed plan amendment adds the Ivanpah Solar Electric Generating System project site to those identified in the current California Desert Conservation Area Plan, as amended, for solar energy production. The decision on the ISEGS project will be to approve, approve with modification, or deny issuance of the rights-of-way grants applied for by Solar Partners I, II, IV, and VIII.

This CDCA Plan Amendment/FEIS for the ISEGS project has been developed in accordance with NEPA and the Federal Land Policy and Management Act of 1976. The CDCA Plan Amendment is based on the Mitigated Ivanpah 3 Alternative which was identified as the Agency Preferred Alternative in the Supplemental Draft Environmental Impact Statement for ISEGS, which was released on April 16, 2010. The CDCA Plan Amendment/FEIS contains the proposed plan amendment, a summary of changes made between the DEIS, SDEIS and FEIS for ISEGS, an analysis of the impacts of the proposed decisions, and a summary of the written and oral comments received during the public review periods for the DEIS and for the SDEIS, and responses to comments.

The BLM will be accepting additional public comment on the CDCA Plan Amendment/FEIS within 30 days after the Environmental Protection Agency publishes the Notice of Availability in the *Federal Register*. Comments can be sent to: George Meckfessel, Planning and Environmental Coordinator, Needles Field Office, 1303 South Highway 95, Needles, CA 92363, or email caisegs@blm.gov.

Pursuant to the BLM's planning regulations at 43 CFR 1610.5-2, any person who participated in the planning process for the CDCA Plan Amendment and has an interest that is or may be adversely affected by the proposed plan amendment may protest approval of the plan amendment within 30 days from the date the Environmental Protection Agency (EPA) publishes the Notice of Availability in the *Federal Register*. For further information on filing a protest, please see the accompanying protest regulations in the page that follows (labeled as Attachment 1). The regulations specify the required elements in a protest. Protesting parties should take care to document all relevant facts and, as much as possible, reference or cite the planning documents or available planning records (e.g., meeting minutes or summaries, correspondence, etc.).

All protests must be in writing and mailed to the following address:

Regular Mail:	Overnight Mail:
Director (210)	Director (210)
Attention: Brenda Williams	Attention: Brenda Williams
P.O. Box 66538	1620 L Street, N.W., Suite 1075
Washington, D.C. 20035	Washington, D.C. 20036

Before including your address, phone number, e-mail address, or other personal identifying information in your protest, be advised that your entire protest – including your personal identifying information – may be made publicly available at any time. While you can ask us in your protest to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

All protests must be received by the Director by the close of the protest period to be accepted as valid. Protests that are postmarked by the close of the protest period but received by the Director after the close of the protest period will only be accepted as valid if the protesting party also provides a faxed or e-mailed advance copy before the close of the protest period. To provide the BLM with such advance notification, please fax protests to the attention of Brenda Hudgens-Williams- BLM protest coordinator at 202-912-7129, or e-mail protests to: Brenda_Hudgens-Williams@blm.gov.

The BLM Director will make every attempt to promptly render a decision on each valid protest. The decision will be in writing and will be sent to the protesting party by certified mail, return receipt requested. The decision of the BLM Director shall be the final decision of the Department of the Interior. Responses to protest issues will be compiled in a Director's Protest Resolution Report that will be made available to the public following issuance of the decisions.

Upon resolution of all land use plan protests, the BLM will issue a Record of Decision (ROD) adopting the Approved CDCA Plan Amendment and making a decision regarding issuance of the right-of-way grant. Copies of the ROD will be mailed or made available electronically to all who participated in this NEPA process and will be available to all parties through the Needles Field Office website (*http://www.blm.gov/ca/st/en/fo/needles/nefo_nepa.html*), or by mail upon request.

Sincerely,

Raymond C. Lee
Field Manager, Needles

Protest Regulations

[CITE: 43CFR1610.5-2]

TITLE 43--PUBLIC LANDS: INTERIOR
CHAPTER II--BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR
PART 1600--PLANNING, PROGRAMMING, BUDGETING--Table of Contents
Subpart 1610--Resource Management Planning
Sec. 1610.5-2 Protest procedures.

(a) Any person who participated in the planning process and has an interest which is or may be adversely affected by the approval or amendment of a resource management plan may protest such approval or amendment. A protest may raise only those issues which were submitted for the record during the planning process.

(1) The protest shall be in writing and shall be filed with the Director. The protest shall be filed within 30 days of the date the Environmental Protection Agency published the notice of receipt of the final environmental impact statement containing the plan or amendment in the Federal Register. For an amendment not requiring the preparation of an environmental impact statement, the protest shall be filed within 30 days of the publication of the notice of its effective date.

(2) The protest shall contain:

(i) The name, mailing address, telephone number and interest of the person filing the protest;
(ii) A statement of the issue or issues being protested;
(iii) A statement of the part or parts of the plan or amendment being protested;
(iv) A copy of all documents addressing the issue or issues that were submitted during the planning process by the protesting party or an indication of the date the issue or issues were discussed for the record; and
(v) A concise statement explaining why the State Director's decision is believed to be wrong.

(3) The Director shall promptly render a decision on the protest.

(b) The decision shall be in writing and shall set forth the reasons for the decision. The decision shall be sent to the protesting party by certified mail, return receipt requested. The decision of the Director shall be the final decision of the Department of the Interior.

ABSTRACT

ENVIRONMENTAL IMPACT STATEMENT

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM PROJECT

( ) Draft (X) Final

Lead Agency: The United States Department of the Interior, Bureau of Land Management Needles Field Office

Location: San Bernardino County, California

Address Protests on this Proposed Plan Amendment to:

Regular Mail:	Overnight Mail:
Attn: Brenda Williams	Attn: Brenda Williams
Director (210)	Director (210)
PO Box 66538	1620 L Street NW Suite 1075
Washington, DC 20035	Washington, DC 20036

Address Comments on this EIS to: Bureau of Land Management Attention: George Meckfessel, Planning and Environmental Coordinator, 1303 S. Hwy. 95, Needles, CA 92363

or Email: caisegs@blm.gov

Comment Deadline: 30-days from date of EPA Notice of Availability.

The Bureau of Land Management (BLM) has received a proposal from Solar Partners I, II, IV, and VIII, limited liability corporations formed by BrightSource Energy (BrightSource), to construct and operate a solar thermal electric generating facility in San Bernardino County, California. The project would generate up to 400 megawatts (MW) of electricity using solar thermal technology.

The proposed project was analyzed in a Draft Environmental Impact Statement that was published on November 13, 2009. The proposed project consists of three separate solar generating facilities, each consisting of a field of heliostats (mirrors) reflecting solar radiation to the top of a 459-foot tall power tower received unit. Heated fluid within the power tower receivers would be used to boil water to generate steam, which would turn a turbine and generate electricity. The permanent ROW required for the heliostat fields and power towers would occupy approximately 3,670 acres. An additional 377 acres would be used to support a Construction Logistics Area, and for shared facilities such as an administration building, maintenance warehouse, substation, and groundwater supply wells. Approximately 24 acres would be used for a natural gas supply pipeline ROW, and for access roads. The proposed project would cause the surface disturbance of approximately 4,073 acres during construction.

Two additional alternatives were considered in detail in the Supplemental Draft Environmental Impact Statement (SDEIS), which was published by BLM on April 16, 2010. SDEIS analyzed a reduced acreage alternative called the Mitigated Ivanpah 3 Alternative, and a reconfigured alternative called the Modified I-15 Alternative. The facility evaluated in each of these alternatives is a solar thermal electric generating facility with a generating capacity of 370 MW.

The Mitigated Ivanpah 3 Alternative is identified as the agency preferred alternative in this EIS.

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LIST OF ACRONYMS

μg/m^3	micrograms per cubic meter
AAQS	ambient air quality standards
AB	Assembly Bill
AC	alternating current
ACC	air cooled condensers
ACEC	Area of Critical Environmental Concern
AED	automatic external defibrillator
AFY	acre-feet per year
AFC	Application for Certification
AML	Appropriate Management Levels
amsl	above mean sea level
ANSI	American National Standards Institute
AO	Authorized Officer
APLIC	Avian Powerline Interaction Committee
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
ARB	Air Resource Board
ARMR	Archaeological Resource Management Report
ARRA	American Recovery and Reinvestment Act of 2009
ASME	American Society for Material Engineering
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
AUM	animal unit months
BA	Biological Assessment
BACT	Best Available Control Technology
BCC	Birds of Conservation Concern
BLM	Bureau of Land Management
BMP	best management practice
BNSF	Burlington Northern Santa Fe
BO	Biological Opinion
BOE	Board of Equalization
BRMIMP	Biological Resources Mitigation Implementation and Monitoring Plan
BVUSD	Baker Valley Unified School District
CAA	Clean Air Act
CAISO	California Independent System Operator
Cal-ARP	California Accidental Release Program
CAM	crassulacean acid metabolism
CAPCOA	California Air Pollution Control Officers Association
CBO	Chief Building Official
CBSC	California Building Standards Code

CCDOA	Clark County Department of Aviation
CCR	California Code of Regulations
CCSD	Clark County School District
CCTV	Closed Circuit TV
CDCA	California Desert Conservation Area
CDD	California Desert District
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDMG	California Department of Water Resources
CDPH	California Department of Public Health
CEMS	continuous emissions monitoring system
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFATS	Chemical Facility Anti-Terrorism Standard
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CLA	Construction Logistics Area
CMP	Congestion Management Plan
CNDDB	California Department of Fish and Game Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
COC	Condition of Certification
CPM	Construction Project Manager
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CRM	Cultural Resource Monitor
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
CSP	Concentrated Solar Power
CSS	Construction Safety Supervisor
CUPA	Certified Unified Program Authority
CVC	California Vehicle Code
CWA	Clean Water Act
DEHS	Department of Environmental Health Services
DEIS	Draft Environmental Impact Statement
DEM	digital elevation model
DESCP	Drainage Erosion and Sediment Control Plan
DHS	U.S. Department of Homeland Security
DOE	U. S. Department of Energy

DOI	U. S. Department of Interior
DOT	U.S. Department of Transportation
DPA	Desert Protection Act
DPM	Diesel Particulate Matter
DPR	Department of Parks and Recreation
DRP	Demand Response Program
DTRO	Desert Tortoise Recovery Office
DTRPAC	Desert Tortoise Recovery Planning Assessment Committee
DTSC	Department of Toxic Substances Control
DWMA	Desert Wildlife Management Area
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EITL	Eldorado-Ivanpah Transmission Line
EITP	Eldorado-Ivanpah Transmission Project
EMF	electric and magnetic field
EMS	emergency medical services
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 2005
EPS	Emission Performance Standard
ERC	emission reduction credit
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDOC	Final Determination of Compliance
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FGR	flue gas recirculation
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
fps	feet per second
FSA	Final Staff Assessment
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GPS	global positioning system
GWh	gigawatt-hours
H_2S	hydrogen sulfide
HAER	Historic American Engineering Record
HAP	Hazardous Air Pollutant
HARP	Hotspots Analysis and Reporting Program
HDP	Heritage Documentation Program
HFC	hydrofluorocarbon
HI	Hazard Index
HMA	Herd Management Area
HMBP	Hazardous Materials Business Plan

hp	horsepower
HSC	Health and Safety Code
IEEE	Institute of Electrical and Electronics Engineers
IEPR	Integrated Energy Policy Report
IIPP	Injury and Illness Prevention Program
IM	Instruction Memorandum
ISC	Interruptible Service Contract
ISEGS	Ivanpah Solar Electric Generating System
ISO	Independent System Operator
IVAB	Ivanpah Valley Air Basin
IVGB	Ivanpah Valley Groundwater Basin
KOP	Key Observation Point
KRGT	Kern River Gas Transmission Company
kV	kilovolt
kW	kilowatt
lb	pound
LID	Low-Impact Development
LOS	Level of Service
LRP	Load Reduction Program
LVMPD	Las Vegas Metropolitan Police Department
m	meter
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Levels
MCLB	Marine Corps Logistics Base
MCR	Monthly Compliance Report
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MEER	mechanical and electrical equipment room
mG	milligauss
mg/l	milligrams per liter
MLD	Most Likely Descendent
MMBtu/hr	million British thermal units per hour
MNP	Mojave National Preserve
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPE	maximum permissible exposure
mph	miles per hour
MSA	Metropolitan Statistical Area
MT	metric tons
MTCO2E	metric tons of CO_2 equivalent
MUC	Multiple-Use Class
MVA	megavolt-ampere
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission

NCA	Noise Compatibility Area
NEMO	Northern and Eastern Mojave
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NFWF	National Fish and Wildlife Foundation
NH_3	ammonia
NHPA	National Historic Preservation Act
NIOSH	National Institute of Safety and Health
NO	nitric oxide
NO_2	nitrogen dioxide
NO_3	nitrates
NOA	Notice of Availability
NOI	Notice of Intent
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
NTP	Notice to Proceed
O&M	operations and maintenance
O_3	ozone
°C	degrees Celsius
OCA	Off-site Consequence Analysis
OEHHA	Office of Environmental Health Hazard Assessment
OHV	off-highway vehicle
OLM	Ozone Limiting Method
ORV	off-road vehicle
OSHA	Occupational Safety and Health Administration
OTC	once-through cooling
PAH	Polynuclear Aromatic Hydrocarbon
PAO	Public Adviser's Office
PAR	Property Analysis Record
PCF	paid-call firefighters
PDOC	Preliminary Determination of Compliance
PEA	Proponent's Environmental Assessment
PEIS	Programmatic Environmental Impact Statement
PFC	perfluorocarbon
PM	Particulate Matter
PMAP	Particulate Matter Attainment Plan
PMI	point of maximum impact
POD	Plan of Development
PPE	personal protective equipment

ppm	parts per million
PRC	Public Resources Code
PRM	Paleontological Resource Monitors
PRMMP	paleontological resources monitoring and mitigation plan
PRR	Paleontological Resources Report
PRS	paleontological resource specialist
PSA	Preliminary Staff Assessment
PSD	Prevention of Significant Deterioration
PTO	Permit to Operate
PTZ	pan, tilt, and zoom
PUP	Pesticide Use Proposal
PV	photovoltaic
PVMRM	Plume Volume Molar Ratio Method
PYFC	Potential Fossil Yield Classification
QFER	Quarterly Fuel and Energy Report
RC	Resource Conservation
RCRA	Resource Conservation Recovery Act
REAT	Renewable Energy Action Team
RETI	Renewable Energy Transmission Initiative
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
RPS	Renewables Portfolio Standard
RWQCB	Regional Water Quality Control Board
SAC	Science Advisory Committee
SANBAG	San Bernardino Associated Governments
SB	Senate Bill
SBAIC	San Bernardo Archeological Information Center
SBCFD	San Bernardino County Fire Department
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SDEIS	Supplemental Draft Environmental Impact Statement
SEGS	Solar Electric Generating System
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Officer
SMARA	Surface Mining and Reclamation Act
SO_2	sulfur dioxide
SO_4	sulfates
SOx	sulfur oxide
SPCC	spill prevention, control, and countermeasures
STG	steam turbine-generator
SVP	Society of Vertebrate Paleontology
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resource Control Board

TAC	toxic air contaminant
TCP	Traffic Control Plan
TDS	total dissolved solids
TUC	Transportation Utility Corridor
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USCS	Unified Soils Classification System
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
V/C	volume-to-capacity
VMT	vehicle miles travelled
VOC	volatile organic compound
VR	Visual Resource
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WA	Wilderness Area
WEAP	Worker Environmental Awareness Program
WEC	wave energy conversion
WECC	Western Electricity Coordinating Council
WIU	Wilderness Inventory Units
WWTP	Wastewater Treatment Plant

4.5 Hazardous Materials Management

Introduction

The purpose of this section of this EIS is to determine if the proposed ISEGS could potentially cause adverse impacts to the public from the use, handling, storage, or transportation of hazardous materials at the proposed project site. If direct, adverse impacts on the public are identified, BLM must evaluate facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed project site. Employers must inform employees of hazards associated with their work and provide those employees with special protective equipment and training to reduce the potential for health impacts from the handling of hazardous materials. Section 4.15 of this document describes the protection of workers from those risks.

Resource-Specific Project Description

For this analysis, BLM examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The worst case plausible event, regardless of cause, is considered, and analyzed to see whether there would be a threat to local populations. Hazardous material handling and usage procedures are designed to reduce the likelihood of a spill, to reduce its potential size, and to prevent or reduce the potential migration of a spill off site to the extent that there would not be off-site impacts. These measures look at potential direct contact from runoff of spills, air-borne plume concentrations, and the potential for spills to mix with runoff water and be carried offsite. Generally, BLM seeks to confirm that the applicant has proposed secondary containment basins for containing hazardous material liquids, and that volatile chemicals would have a restricted exposure to the atmosphere after capture. Containment basins are designed to be able to hold the contents of a full tank plus the potential rainfall from a 25-year storm without any loss of containment. In the event of a spill, the spilled material, along with any mixed-in water and any contaminated soils, would then be placed into containers and processed and disposed of as required by regulations. Hazardous materials such as mineral and lubricating oils, corrosion inhibitors, herbicides, and acids and bases to control pH would be present at the proposed project site. Hazardous materials used during the construction phase include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No acutely toxic hazardous materials would be used on-site during construction. None of these materials pose would be expected to cause off-site impacts as a result of the quantities on-site, their relative toxicity, their physical states, and/or their environmental mobility.

Although no natural gas would be stored, the project would involve the handling of moderate amounts of natural gas. Natural gas poses some risk of both fire and explosion. The solar heat used in the boiler (steam) process would be supplemented by burning natural gas to heat a partial load steam boiler when solar conditions are insufficient. Each power plant within the project would include a small package, natural gas-fired start-up boiler to provide additional heat for plant start-up and during temporary cloud cover. Natural gas would be supplied to the site through a six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the new pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. The ROW area required for this section of the pipeline would be 75 feet wide and 0.5 miles long. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line would extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. The extensions of the pipeline into the power blocks would be located within the project fenceline. However, the sections of pipeline along the northern boundary of Ivanpah 3, and then the eastern boundaries of Ivanpah 3 and 2, would be located outside of the fenced heliostat area, in order to allow access to the pipeline for maintenance.

A tap metering station of approximately 100 feet by 150 feet in area would be located at the Kern River Gas Transmission Line. The tap station would measure and record gas volumes. Facilities would be installed at the tap station to regulate the gas pressure, to remove any liquids or solid particles, and facilitate the use of pigs for pipeline inspection and cleaning In addition to the tap station, separate metering sets would be installed for each of the power plant sites. The three metering sets would measure and record gas volumes. As part of the Optimized Project Design, the location of the proposed gas line was re-routed along the west side of Ivanpah 2 and 3 to provide the Southwest Gas Company access to the line for service/repair work (CH2M Hill 2008d).

The ISEGS would also require the transportation of certain liquid and solid hazardous materials to the facility. This document addresses all potential impacts associated with the use, storage, and transport of hazardous materials.

Applicable Laws, Regulations, and Supplemental Authorities

The following federal, state, and local laws and policies apply to the protection of public health and hazardous materials management. BLM's analysis examines the project's compliance with these requirements.

Table 4.5-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law or Regulation	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The CAA of 1990 (42 USC 7401 et seq. as amended)	Establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA Section on Risk Management Plans (42 USC §112(r)	Requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	Requires that the suppliers of hazardous materials prepare and implement security plans in accordance with U.S. Department of Transportation (DOT) regulations.
49 CFR Part 1572, Subparts A and B	Requires that suppliers of hazardous materials ensure that their hazardous material drivers comply with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses the transportation of natural and other gases by pipeline. Requires preparation of annual reports, incident reports, and safety-related condition reports. Also requires operators of pipeline systems to notify the DOT of any reportable incident by telephone and submit a follow-up written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gases by pipeline: Requires minimum federal safety standards, specifies minimum safety requirements for pipelines, and includes material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction, which must be followed for Class 2 and Class 3 pipelines, and requirements for preparing a pipeline integrity management program.
6 CFR Part 27	The Chemical Facility Anti-Terrorism Standard (CFATS) regulation of the U.S. Department of Homeland Security (DHS) that requires facilities that use or store certain hazardous materials to submit information to the DHS so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.

Applicable Law or Regulation	Description
State	
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) requires the preparation of a RMP and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Authority (CUPA) for approval.
Title 8, California Code of Regulations, Section 5189	Requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. While these requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.
Title 8, California Code of Regulations, Section 5189	Sets forth requirements for design, construction, and operation of the vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes including the American Society for Material Engineering (ASME) Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1, and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, Section 41700	Requires that "No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
California Health and Safety Code, section 25270 to 25270.13	The Aboveground Petroleum Storage Act requires a SPCC Plan for facilities with an aboveground storage tank (AST) with a capacity greater than 660 gallons (for a single AST) or 1,320 gallons for all ASTs combined.
Local	
	San Bernardino County does not have additional laws and regulations that apply to Hazardous Materials Handling, but administers the State of California programs as the CUPA.

The SBCFD acts as the Certified Unified Program Authority (CUPA), and is responsible for reviewing Hazardous Materials Business Plans. With regard to seismic safety issues, the proposed ISEGS site is located in Seismic Risk Zone 4. The construction and design of buildings and vessels storing hazardous materials would meet the seismic requirements of the Uniform Building Code (CH2M Hill 2007, section 5.5.2.4).

4.5.1 Affected Environment

Several characteristics of an area in which a project is located affect its potential for an accidental release of a hazardous material. These include:

- local meteorology;
- terrain characteristics; and

- location of population centers and sensitive receptors relative to the project.

Meteorological Conditions

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their health risks. When wind speeds are low and the atmosphere is stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds and ambient air temperatures are described in the Air Quality section (6.3.2) and Appendix G.1 of the AFC (CH2M Hill 2007).

Terrain Characteristics

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume from an accidental release may impact high elevations before it impacts lower elevations. The topography of the ISEGS site (like its immediately surrounding areas) is essentially flat but sloping from west to east with approximately 1.7% grade at about 3,000 feet above sea level. At approximately three miles to the west, the slope terminates in a ridge at about 5,700 feet above sea level. Because of the nature of the surrounding area, the terrain above stack height is not of concern for the project. Due to the local terrain slope, runoff from the local area, as well as any uncaptured liquid runoff from the site, would tend to flow in an easterly direction.

Location of Exposed Populations and Sensitive Receptors

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. There are no sensitive receptors within a 6-mile radius of the project vicinity (CH2M Hill 2007, section 5.9.3). The nearest residence to ISEGS is in Primm, Nevada, five miles northeast of the site (CH2M Hill 2007, figure 5.9-1).

4.5.2 Environmental Consequences

Methodology

BLM reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals and natural gas were evaluated. BLM's analysis examines the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, BLM utilizes the most current acceptable public health exposure levels (both acute and chronic) to protect the public from the effects of an accidental chemical release.

In order to assess the potential of released hazardous materials traveling off-site and affecting the public, BLM analyzed several aspects of the proposed use of materials at the facility. BLM recognizes that some hazardous materials must be used at power plants. Therefore, BLM conducted its analysis by focusing on the choice and amount of chemicals to be used, the manner in which the applicant would use the chemicals, the manner by which it would be transported to the facility and transferred to facility storage tanks, and the way in which the applicant plans to store those materials on-site.

BLM reviewed the applicant's proposed engineering and administrative controls for hazardous material use. Engineering controls are physical or mechanical systems such as storage tanks or automatic shut-off valves that can prevent a spill of hazardous material from occurring, or that can limit the spill to a small amount or confine it to a small area. Administrative controls are rules and procedures that workers must follow to help either prevent accidents or keep them small if they do occur. Both engineering and administrative controls can act as either methods of prevention or methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and harming the public.

BLM reviewed and evaluated the proposed use of hazardous materials, as described by the applicant (CH2M Hill 2007, section 5.5). BLM's assessment followed the five steps listed below:

- Step 1: BLM reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.5-3 of the AFC and determined the need and appropriateness of their use. Only those that are needed and appropriate are allowed to be used. If BLM felt that a safer alternative chemical can be used, BLM would recommend or require its use, depending upon the impacts posed.

- Step 2: Those chemicals, proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off the site and impact the public, were removed from further assessment.

- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different size transfer-hose couplings and administrative controls such as worker training and safety management programs.

- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading, and administrative controls such as training emergency response crews.

- Step 5: BLM analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the applicant-proposed mitigation is not sufficient to reduce the potential for adverse impacts, BLM would propose additional prevention and response controls until the potential for causing harm to the public is reduced. It is only at this point that BLM can recommend that the project be allowed to use hazardous materials.

4.5.2.1 Proposed Project

Construction Impacts

Small Quantity Hazardous Materials

In conducting this analysis, BLM determined in Steps 1 and 2 that most of the proposed materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they would be stored in either solid form or in small quantities, have low mobility, low vapor pressure, or low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are discussed briefly below.

During the construction phase of the project, the only hazardous materials proposed for use include paint, cleaners, solvents, gasoline, diesel fuel, motor oil, welding gases, and lubricants. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, the infrequent use and hence reduced chances of release, and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel all have very low volatility and would represent limited off-site hazards, even in larger quantities.

Operations Impacts

Small Quantity Hazardous Materials

During operations, hazardous chemicals such as cleaning agents, lube oil, sulfuric acid, sodium hydroxide, ammonium hydroxide, diesel fuel and other various chemicals (see **Appendix B – Hazardous Materials** for a list of all chemicals proposed to be used and stored at ISEGS) would be used and stored on-site and represent limited off-site hazard due to their small quantities, low volatility, and/or low toxicity.

Large Quantity Hazardous Materials

After removing from consideration those chemicals that pose no risk of off-site impact in Steps 1 and 2, BLM continued with Steps 3, 4, and 5 to review the remaining hazardous material: natural gas.

Natural Gas

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed mostly of methane, but it also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, tasteless, and lighter than air. Natural gas can cause asphyxiation when methane's concentration exceeds 90%. Methane is flammable when mixed in air at concentrations of 5-14%, which is also its detonation range. Natural gas therefore poses a risk of fire and/or explosion if a release were to occur under certain specific conditions. However, it should be noted that, due to its tendency to disperse rapidly (Lees 1998), natural gas is less likely to result in an unconfined vapor cloud explosion than many other fuel gases such as propane or liquefied petroleum gas although an unconfined vapor cloud of natural gas can explode under certain conditions (as demonstrated by the natural gas explosion in Belgium in July 2004).

While natural gas would be used in significant quantities, it would not be stored on-site. It would be delivered via an existing underground pipeline that runs within a half-mile of the northern perimeter of the ISEGS site. The risk of a fire and/or explosion on-site can be reduced levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA 85A) requires the use of double block and bleed valves for gas shut-off and automated combustion controls. These measures would reduce the likelihood of an explosion in gas-fired equipment. The Safety Management Plan proposed by the applicant would address both the handling and use of natural gas and reduce the potential for equipment failure due to either improper maintenance or human error.

Mitigation

This project's use of hazardous materials poses no significant risk but only if mitigation measures are used. These mitigation measures are discussed in this section. The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a Safety Management Program, which includes both engineering and administrative controls. Elements of facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help prevent accidents and releases (spills) from moving off-site and impacting the community by incorporating engineering safety design criteria into the project's design. Engineering safety features proposed by the applicant include:

- Usage of secondary containment areas surrounding each of the hazardous materials storage areas, designed to contain accidental releases during storage;
- Physical separation of stored chemicals in isolated containment areas, separated by a noncombustible partition in order to prevent the accidental mixing of incompatible materials, which may in turn cause the formation and release of toxic gases or fumes.

Administrative Controls

Administrative controls help prevent accidents and releases (spills) from moving off-site and impacting the community by establishing worker training programs and process safety management programs.

A Worker Health and Safety Program would be prepared by the applicant and include (but not be limited to) the following elements (see Section 4.15 in this analysis for specific regulatory requirements):

- Worker training on chemical hazards, health and safety issues, and hazard communication;
- Procedures to ensure the proper use of personal protective equipment;
- Safety operating procedures for the operation and maintenance of systems that use hazardous materials;
- Fire safety and prevention; and

- Emergency response actions including facility evacuation, hazardous material spill cleanup, and fire prevention.

At ISEGS, the project owner would be required to designate an individual who would have the responsibility and authority to ensure a safe and healthful workplace. This project health and safety official would oversee the health and safety program and would have the authority to halt any action or modify any work practice in order to protect the workers, facility, and the surrounding community in the event that the health and safety program is violated.

Mitigation measure **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC and reviewed for appropriateness, unless there is prior approval. BLM reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.5-3 of the AFC and determined the need and appropriateness of their use. **HAZ-1** also requires changes to the allowed list of hazardous materials and their maximum amounts as listed in **Appendix B - Hazardous Materials** to be approved by BLM's Authorized Officer. Only those that are needed and appropriate would be allowed to be used. If BLM feels that a safer alternative chemical can be used, it would recommend or require its use, depending upon the impacts posed.

A Hazardous Materials Business Plan (HMBP) would also be prepared by the project owner that would incorporate state requirements for the handling of hazardous materials (CH2M Hill 2007, section 5.5.6.4.1). Mitigation measure **HAZ-2** would ensure that the HMBP, which includes the Inventory and Site Map, Emergency Response Plan and Owner/Operator Identification, and Employee Training would be provided to the SBCFD so that SBCFD can better prepare emergency response personnel for handling emergencies which could occur at the facility. In accordance with mitigation measure **HAZ-3**, the project owner would also be responsible to develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan would include procedures, protective equipment requirements, training and a checklist. It would also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan would be applicable during construction, commissioning, and operation of ISEGS.

On-site Spill Response

In order to address spill response, the facility would prepare and implement an emergency response plan which includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, prevention equipment and capabilities, etc. Emergency procedures would be established which include evacuation, spill cleanup, hazard prevention, and emergency response.

A Spill Prevention Control and Countermeasure Plan (SPCC) is required by Federal Regulations and the State Above-Ground Petroleum Storage Act, and would be prepared for the petroleum-containing hazardous materials.

The San Bernardino County HazMat Team is currently based at Fire Station No. 78, in Fontana, California, which is located approximately 175 miles from the project site. The

San Bernardino County HazMat Team response time to a hazmat emergency call from ISEGS is approximately 3 hours (Crawford 2008).

Given the remote location, the hazardous material response time is acceptable, and that the San Bernardino County HazMat Team is adequately trained and equipped to respond to an emergency at ISEGS in a timely manner. The remote location lengthens the response but, at the same time, eliminates the risk of off-site consequences to the public.

Transportation of Hazardous Materials

Containerized hazardous materials including sulfuric acid, and cleaning chemicals, would be transported to the facility via truck. While many types of hazardous materials would be transported to the site, previous modeling of spills involving much larger quantities of more toxic materials, (aqueous ammonia and 93% sulfuric acid) - two hazardous materials that would be used, stored, and transported at the proposed power plant – has demonstrated that minimal airborne concentrations would occur at short distances from the spill.

During construction and operation of ISEGS, minimal amounts and types of hazardous materials (paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, 20% sulfuric acid, and welding gases in standard-sized cylinders) do not pose a significant risk of either spills or public impacts along any transportation route. BLM therefore does not recommend a specific route.

Liquid hazardous materials can be released during a transportation accident, and the extent of their impact in the event of a release would depend on the location of the accident and the rate of vapor dispersion from the surface of the spilled pool. The likelihood of an accidental release during transport is dependent upon three factors:

- The skill of the tanker truck driver;
- The type of vehicle used for transport; and
- Accident rates.

To address this concern, BLM evaluated the risk of an accidental transportation release in the project area. BLM's analysis focused on the project area after the delivery vehicle leaves the main Interstate highway (I-15), because it is appropriate to rely upon the extensive regulatory program that applies to shipment of hazardous materials on California Highways to ensure safe handling in general transportation (see the Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, the U.S. Department of Transportation Regulations 49 CFR Subpart H, §172-700, and the California DMV Regulations on Hazardous Cargo). These regulations also address issues of driver competence. See AFC section 6.13.1 for additional information on regulations governing the transportation of hazardous materials.

Seismic Issues

The possibility exists that an earthquake could cause the failure of a hazardous materials storage tank. A quake could also cause the failure of the secondary containment system (berms and dikes), as well as electrically controlled valves and pumps. The failure of all these preventive control measures might then result in a vapor cloud of hazardous materials that could move off-site and impact residents and workers in the surrounding community. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, heighten concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused to several large and small storage tanks at the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while newer tanks sustained lesser damage with displacements and attached line failures. Therefore, BLM conducted an analysis of the codes and standards, which should be followed to adequately design and build storage tanks and containment areas that could withstand a large earthquake. BLM also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks were impacted by this quake. Referring to the sections on Geologic Resources and Hazards and Facility Design in the AFC, it is noted that the proposed facility would be designed and constructed to the applicable standards of the 2007 California Building Code for Seismic Zone 4 (CH2M Hill 2007, section 5.4.2, Table 5.4-1). Therefore, on the basis of occurrences at Northridge with older tanks and the lack of failures during the Nisqually earthquake with newer tanks, it is assumed that tank failures during seismic events are not likely and do not represent a significant risk to the public.

Site Security

ISEGS proposes to use hazardous materials where special site security measures should be developed and implemented to prevent unauthorized access. EPA published a *Chemical Accident Prevention Alert* regarding site security (EPA 2000a), the U.S. Department of Justice published a special report on Chemical Facility Vulnerability Assessment Methodology (DOJ 2002), the NERC published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the DOE published a draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical Infrastructure listed by the DHS. On April 9, 2007, the DHS published, in the Federal Register (6 CFR Part 27), an Interim Final Rule requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007.

In order to ensure that this facility (or a shipment of hazardous material) is not the target of unauthorized access, mitigation measures **HAZ-4** and **HAZ-5** address both Construction Security and Operations Security Plans. These plans would require the implementation of site security measures that are consistent with both the above-referenced documents and Energy Commission guidelines.

The goal of these measures is to provide the minimum level of security for power plants needed to protect California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this power plant is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event.

In order to determine the level of security, BLM used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, the DOE VAM-CF model, and DHS regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). BLM determined that ISEGS would fall into the "low vulnerability" category, so BLM proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures include perimeter fencing and breach detectors, possibly guards, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach. Site access for vendors would be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors would have to maintain their transport vehicle fleets and employ only drivers who are properly licensed and trained. The project owner would be required, through its contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the DOT requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.800 and ensure that all hazardous materials drivers are in compliance with personnel background security checks per 49 CFR Part 1572, Subparts A and B. BLM's Authorized Officer may authorize modifications to these measures, or may require additional measures in response to additional guidance provided by the DHS, the DOE, or NERC, after consultation with appropriate law enforcement agencies and the applicant.

Pursuant to DOE's policy set out in a December 1, 2006, memorandum, "Need to Consider Intentional Destructive Acts in NEPA Documents," DOE has considered the potential environmental consequences of intentional destructive acts at the Ivanpah facility. DOE concludes that the proposed Ivanpah facility presents an unlikely target for an act of terrorism or sabotage and has an extremely low probability of attack. Further, as indicated elsewhere in this section, in order to ensure that the facility (or shipment of hazardous material) is not the target of unauthorized access, two conditions of certification (**HAZ-4** and **HAZ-5**) have been imposed on the project by the California Energy Commission. These require a Construction Site Security Plan and an Operation Security Plan. The Operation Security Plan requires a minimum eight foot perimeter fence around the Power Block and Solar Field along with numerous other security measures. Finally, DOE notes that the environmental impact of any intentional destructive act that could occur is addressed in the impact analysis of containment incidents for hazardous materials, fire, and transportation accidents in this section.

Closure and Decommissioning

The requirements for handling of hazardous materials remain in effect until such materials are removed from the site, regardless of facility closure. Therefore, the facility owners are responsible for continuing to handle such materials in a safe manner, as required by applicable laws. In the event that the facility owner abandons the facility in a manner that poses a risk to surrounding populations, BLM would coordinate with the California Office of Emergency Services, San Bernardino County Fire Department, and the California Department of Toxic Substances Control (DTSC) to ensure that any unacceptable risk to the public is eliminated. Funding for such emergency action as well as site removal, rehabilitation and revegetation activities would be available from a performance bond required of the applicant by BLM in accordance with mitigation measure **LAND-1**.

Beneficial Impacts

BLM has not identified any noteworthy public benefits associated with the use of hazardous materials at the proposed project.

4.5.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

The construction impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with the use of hazardous materials in the fabrication and installation of project-related structures, including the use of hazardous materials used for maintenance of vehicles and construction equipment. For the proposed project, the management of hazardous materials would be conducted in compliance with regulatory requirements and mitigation measures, and would therefore not result in any impacts.

The construction of the Mitigated Ivanpah 3 Alternative would be expected to use the same types and amounts of hazardous materials as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the construction would occur with the same type and amount of equipment and workers as the proposed project. The primary difference would be that the duration of construction would be expected to be shorter for the Mitigated Ivanpah 3 Alternative, by approximately 17 percent.

Although the use of hazardous materials would be the same for the construction of both alternatives, the overall amount of materials associated with the Mitigated Ivanpah 3 Alternative would be lower, due to the reduced duration of construction.

Operations Impacts

The operations impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with the use of hazardous materials in the operation of the power blocks, including the use of hazardous materials used for maintenance of vehicles and maintenance equipment. For the proposed project, management of hazardous materials would be conducted in compliance with regulatory requirements and mitigation measures, and would therefore not result in any impacts.

The operations of the Mitigated Ivanpah 3 Alternative would be expected to use the same types and amounts of hazardous materials as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the operations would occur with the same type and amount of equipment and workers as the proposed project. Therefore, there would not be any substantial difference in impacts associated with hazardous materials management between the proposed project and the Mitigated Ivanpah 3 Alternative.

Closure and Decommissioning Impacts

The closure and decommissioning impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with the use of hazardous materials necessary to remove project-related structures, including the use of hazardous materials for maintenance of vehicles and earthmoving and demolition equipment. For the proposed project, management of hazardous materials would be conducted in compliance with regulatory requirements and mitigation measures, and would therefore not result in any impacts.

The closure and decommissioning of the Mitigated Ivanpah 3 Alternative would be expected to use the same types and amounts of hazardous materials as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the closure and decommissioning would occur with the same type and amount of equipment and workers as the proposed project. The primary difference would be that the duration of closure and decommissioning would be expected to be shorter for the Mitigated Ivanpah 3 Alternative, by approximately 17 percent. Although the use of hazardous materials would be the same for the closure of both alternatives, the overall amount of materials associated with the Mitigated Ivanpah 3 Alternative would be lower, due to the reduced duration of closure and decommissioning activities.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with hazardous materials management.

4.5.2.3 Modified I-15 Alternative

Construction Impacts

The construction impacts resulting from the Modified I-15 Alternative would be associated with the use of hazardous materials in the fabrication and installation of project-related structures, including the use of hazardous materials used for maintenance of vehicles and construction equipment. For the proposed project, the management of hazardous materials would be conducted in compliance with regulatory requirements and mitigation measures, and would therefore not result in any impacts

The construction of the Modified I-15 Alternative would be expected to use the same types and amounts of hazardous materials as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the construction would occur with the same type and amount of equipment and workers as the proposed project. The primary difference would be that the duration of construction would be expected to be shorter for the Modified I-15 Alternative, by approximately 17 percent. Although the use of hazardous materials would be the same for the construction of both alternatives, the overall amount of materials associated with the Modified I-15 Alternative would be lower, due to the reduced duration of construction.

Operations Impacts

The operations impacts resulting from the Modified I-15 Alternative would be associated with the use of hazardous materials in the operation of the power blocks, including the use of hazardous materials used for maintenance of vehicles and maintenance equipment. For the proposed project, management of hazardous materials would be conducted in compliance with regulatory requirements and mitigation measures, and would therefore not result in any impacts

The operations of the Modified I-15 Alternative would be expected to use the same types and amounts of hazardous materials as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the operations would occur with the same type and amount of equipment and workers as the proposed project. Therefore, there would not be any substantial difference in impacts associated with hazardous materials management between the proposed project and the Modified I-15 Alternative.

Closure and Decommissioning Impacts

The closure and decommissioning impacts resulting from the Modified I-15 Alternative would be associated with the use of hazardous materials necessary to remove project-related structures, including the use of hazardous materials for maintenance of vehicles and earthmoving and demolition equipment. For the proposed project, the management of hazardous materials would be conducted in compliance with regulatory requirements and mitigation measures, and would therefore not result in any impacts

The closure and decommissioning of the Modified I-15 Alternative would be expected to use the same types and amounts of hazardous materials as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the closure and decommissioning would occur with the same type and amount of equipment and workers as the proposed project. The primary difference would be that the duration of closure and decommissioning would be expected to be shorter for the Modified I-15 Alternative, by approximately 17 percent. Although the use of hazardous materials would be the same for the closure of both alternatives, the overall amount of materials associated with the Modified I-15 Alternative would be lower, due to the reduced duration of closure and decommissioning activities.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with hazardous materials management.

4.5.2.4 No Action Alternative

As the use of hazardous materials at the proposed project would have no direct, adverse impacts off-site, there would be no impact on the public resulting from their use.

Thus, the No Action alternative would not avoid or lessen any direct, adverse impacts compared to the proposed project.

4.5.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

The construction and operation of ISEGS would be in compliance with all applicable laws and regulations for both long-term and short-term project impacts in the area of hazardous materials management.

4.5.4 Mitigation Measures

HAZ-1 The project owner shall not use any hazardous materials not listed in **Appendix B - Hazardous Materials**, below, or in greater quantities than those identified by chemical name in **Appendix B - Hazardous Materials,** unless approved in advance by the BLM's Authorized Officer and the CPM.

Verification: The project owner shall provide to BLM's Authorized Officer and the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan to the Hazardous Materials Division of the County of San Bernardino Fire Department, BLM's Authorized Officer and the CPM for review. After receiving comments from the Hazardous Materials Division of the County of San Bernardino Fire Department, BLM's Authorized Officer and the CPM, the project owner shall reflect all received recommendations in the final documents. If no comments are received from the county within 30 days of submittal, the project owner may proceed with preparation of final documents upon receiving comments from BLM's Authorized Officer and the CPM. Copies of the final Hazardous Materials Business Plan shall then be provided to the Hazardous Materials Division of the County of San Bernardino Fire Department for information and to the BLM's Authorized Officer and the CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan to BLM's Authorized Officer and the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan shall be applicable during construction, commissioning, and operation of the power plant.

Verification: At least sixty (60) days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to BLM's Authorized Officer and the CPM for review and approval.

HAZ-4 Prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to BLM's Authorized Officer and the CPM for review and approval.

Verification: At least thirty (30) days prior to commencing construction, the project owner shall notify BLM's Authorized Officer and the CPM that a site-specific Construction Security Plan is available for review and approval. The Construction Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
5. Protocol for contacting law enforcement, BLM's Authorized Officer and the CPM in the event of suspicious activity or emergency; and
6. Evacuation procedures

HAZ-5 The project owner shall prepare a site-specific Operation Security Plan for the operational phase, which shall be made available to BLM's Authorized Officer and the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage.

Verification: At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify BLM's Authorized Officer and the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

The level of security to be implemented shall not be less than that described below (as per NERC 2002). The Operations Security Plan shall include the following:

1. Permanent full perimeter fence or wall, at least eight feet high around the Solar Field;
2. Main entrance security gate, either hand operable or motorized;
3. Evacuation procedures;
4. Protocol for contacting law enforcement, BLM's Authorized Officer and the CPM in the event of suspicious activity or emergency or conduct endangering the facility, its employees, or contractors; and

5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
    a. A statement (refer to sample, attachment "A") signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;
    b. A statement(s) (refer to sample, attachment "B") signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by BLM's Authorized Officer and the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by BLM's Authorized Officer and the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;
6. Site access controls for employees, contractors, vendors, and visitors;
7. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate; and
8. Additional measures to ensure adequate perimeter security consisting of either:
    a. Security guard present 24 hours per day, seven days per week, **OR**
    b. Power plant personnel on-site 24 hours per day, seven days per week and **all** of the following:
        1) The CCTV monitoring system required in number 8 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100% of the perimeter fence, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **AND**
        2) Perimeter breach detectors **or** on-site motion detectors.

The project owner shall fully implement the security plans and obtain BLM's Authorized Officer and the CPM approval of any substantive modifications to the security plans. BLM's Authorized Officer and the CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power plant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the applicant.

HAZ-6 The holder (project owner) shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b

Verification: A copy of any report required or requested by any Federal or State governmental entity as a result of a reportable release or spill of any toxic substances shall be furnished to BLM's Authorized Officer and the CPM concurrent with the filing of the report with the Federal or State governmental entity.

4.5.5 Summary

Hazardous material use, storage, and transportation associated with the proposed project would not pose any direct, indirect, or cumulative adverse impact. The proposed project would be designed, constructed, and operated in compliance with applicable laws and regulations, which would protect the public from risk of exposure to an accidental release of hazardous materials. Mitigation measures would be implemented, as follows. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the BLM's Authorized Officer. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during both the construction and operation phases is addressed in **HAZ-4** and **HAZ-5.** **HAZ-6** ensures that the applicant complies with all Federal laws and regulations, regarding use, management, spills, and reporting of hazardous materials on Federal lands.

Because there is no potential for hazardous materials release to extend beyond the facility boundary, there is also no adverse impact to the environment. For any other potential impacts upon the environment, including vegetation, wildlife, air, soils, and water resulting from hazardous materials usage and disposal at the proposed facility, the reader is referred to Sections 4.1, 4.3, 4.10 and 4.14 of this EIS.

Overall, by following regulatory requirements and mitigation measures, there would be no potential impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any hazards associated with hazardous materials use would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration of construction and reduced acreage of operations.

Table 4.5-2
Comparison of Hazardous Materials Management Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Release of hazardous materials	No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	No potential impact

4.6 Land Use

Introduction

The land use analysis of the ISEGS focuses on the project's consistency with the land use regulations, plans, and policies, and the project's compatibility with existing and planned land uses. In general, a power plant and its related facilities have the potential to create land use impacts if they create unmitigated noise, dust, public health hazard or nuisance, traffic, or visual impacts. These individual resource areas are discussed in separate sections of this document. Because the power plant site and associated linear project features are located on public land managed by the BLM, the project will require federal environmental review before BLM can issue a right-of-way grant allowing the use of public land.

Resource-Specific Project Description

The proposed project would occupy approximately 4,073 acres of public land managed by BLM. In addition to use of the proposed right-of-way area, the applicant proposes some project-related activities to occur outside of the project fence, on land not included within the proposed right-of-way area. As presented in the applicant's Revised Project Description, a variety of project-related activities must be conducted outside of the project security fence, including:

- Inspection and maintenance of security fence and tortoise exclusion fence;
- Underground utility repairs;
- Installation of new underground pipeline;
- Maintenance of drainage systems, including removal of debris and sediment; and
- Installation of new stormwater drainage systems (CH2M Hill 2009a).

In addition to these activities, a roadway would need to be maintained outside of the project fence to allow vehicle and equipment access for these activities. The Revised Project Description does not define specific locations or acreages for these activities. Instead, it states that some activities, such as installation of new stormwater drainage systems, could disturb greater than one acre, with no upward bound placed on the projected disturbance.

Throughout most of the proposed right-of-way area, the applicant proposes that the security and tortoise exclusion fence be inset from the right-of-way boundary to allow access for these activities. These inset distances range from 65 feet where natural gas pipeline is buried to 12 feet in areas without pipeline. However, there are certain portions of the proposed facility where the security fence is proposed to be coincident with the right-of-way boundary. This includes the entire perimeter of Ivanpah 1, and the southern and western edge of Ivanpah 3. In these areas, all of the described maintenance and repair activities would have to occur on lands that are not included within the proposed right-of-way grant. In addition, the total area of disturbance that would occur as a result of these activities is not defined. The potential area of disturbance associated with new stormwater drainage systems is defined as "one acre or more". Since the buffer distance between the security fence and the right-of-way boundary in other areas is as low as 12 feet, the development of stormwater drainage systems that exceed one acre in size would likely extend outside of the right-of-way boundary (CH2M Hill 2009e, Drainage, Erosion and Sediment Control Plan Figure 15 – Access Roadway Plan).

Table 4.6-1 gives the land use and general plan designations for each project component.

Table 4.6-1
Existing Land Uses and General Plan Designations

Project Component	Existing Land Uses	Land Management or General Plan Land Use and Zoning Designations
Site Vicinity	SCE 115kV transmission line is located adjacent to the site boundary in a southwest to northeast orientation. The Kern River Gas Transmission Company line is located less than a half mile from the Ivanpah 3 boundary. Both utilities are within designated Utility Corridors for major utilities.	BLM Multiple-Use Class L Limited Use Designated Utility corridor San Bernardino County General Plan and Development Code Land Use Zones Resource Conservation (RC)
ISEGS Site	The project site is mostly undeveloped, vacant land. Existing transmission lines cross the project site in a southwest to northeast orientation between Ivanpah 1 and Ivanpah 2. These transmission lines exist within Utility Corridor BB, a two-mile wide corridor approved in the CDCA Plan for use for transmission lines, pipelines, and other linear utilities. The project site also covers portions of Utility Corridor D. Colosseum Road passes through the southeast portion of Ivanpah 2 and travels in a west to southwesterly direction. Unpaved dirt roads also cross the project site, some of which are located adjacent to the transmission lines. No additional development is present on the site.	BLM Multiple-Use Class L Limited Use Designated Utility corridor San Bernardino County General Plan and Development Code Land Use Districts Resource Management District and RC

Project Component	Existing Land Uses	Land Management or General Plan Land Use and Zoning Designations
Gas Line	Onsite and offsite gas lines are located on structurally undeveloped land. The Ivanpah 1 gas line would cross under existing transmission lines. The gas lines would cross an existing unpaved road.	BLM Multiple-Use Class L Limited Use San Bernardino County General Plan and Development Code Land Use Districts Resource Management District and RC
Transmission Lines	Onsite and offsite transmission lines would be located for the most part within the site boundary, those linears that extend outside of the site boundary are located within existing rights-of-way.	BLM Multiple-Use Class L Limited Use San Bernardino County– General Plan and Development Code Land Use Districts Resource Management District and RC

Source: Ivanpah AFC

Applicable Laws, Regulations, and Supplemental Authorities

The following table contains all applicable land use laws and regulations.

Table 4.6-2
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law	Description
Federal Bureau of Land Management	CDCA Plan Northern and Eastern Mojave Desert Management Plan Code of Federal Regulations Title 40; § 1508.27 Code of Federal Regulations Title 43; §1610.5-3, 2800 Federal Land Policy and Management Act (1976)
State	There are no state land use laws and regulations for this project
Local	The San Bernardino County General Plan San Bernardino County 2007 Development Code is not applicable to Federal Lands.

4.6.1 Affected Environment

The Ivanpah Valley area has approximately 37,280 acres of land bounded by the Mojave National Preserve at Nipton Road on the south and southwest, a power line road parallel to and south of Interstate 15 (I-15) across Ivanpah Dry Lake on the northwest and north, and the Nevada border on the east. It is also adjacent to the Stateline and Mesquite Wilderness Areas. The easternmost portion of the valley includes extensive private land, and is undergoing substantial development at the Nevada border. This development includes casinos and associated hotels, restaurants, a golf course and other tourist attractions. Future development in the area would include solar facilities and a commercial service airport (Southern Nevada Supplemental Airport) north of Primm, Nevada.

The proposed ISEGS project would be located in the Mojave Desert, in San Bernardino County, 3.1 miles west of the California/Nevada border on public land managed by the BLM. The project would be west of Ivanpah Dry Lake, north of I-15. The project would be located entirely on public land and would be under federal jurisdiction. There are no schools, day-care facilities, convalescent centers, or hospitals within the immediate vicinity of the project study area. The project study area does include land that is designated for use as Utility Corridors (Corridors D and BB) in the CDCA Plan. The town of Primm, Nevada (population 436), is located about 4.5 miles northeast of the project site. Edwards Air Force Base is located 145 miles west-southwest of the site.

Interstate 15 provides access from southern California to Nevada. I-15 is located to the east of the project area and crosses into Nevada approximately 4 miles northeast of the project site. State Route 164 intersects I-15 just south of the project area. The I-15 Yates Well Road northbound and southbound off-ramps provide access to the project site by way of Colosseum Road, an existing road that is paved to the Primm Valley Golf Club, but unpaved the remainder of its length. Primm Valley Golf Club is located about 0.5 mile east of the Ivanpah 1 site boundary. The golf course is affiliated with the Primm Valley Casino Resorts located in Las Vegas, Nevada and is a public course.

The Ivanpah Dry Lake is located approximately 1.6 miles east of the project site and covers approximately 35 square miles. This area is open to non-motorized vehicles and is a popular destination for recreational activities such as land sailing, archery, and kite buggies. The area also provides diverse recreational and scenic opportunities for off-highway vehicle use.

4.6.2 Environmental Consequences

Methodology

Under federal law, BLM is responsible for processing requests for rights-of-way to authorize the projects and associated transmission lines and other appurtenant facilities to be constructed and operated on land it manages. In processing the applications, BLM must comply with NEPA and with Title 40, CFR, § 1508.27, which requires that potential impacts be evaluated, as defined and used in NEPA with consideration given to both context and intensity. BLM must also comply with 43 CFR §1610.5 Resource Management Plan that requires the proposed project to conform to an approved plan, which in this case is the CDCA Plan and its amendments, including the NEMO plan. BLM right-of-way regulations that govern the issuance of right-of-way grants are found at 43 CFR 2800. The land area included within the proposed right-of-way grant includes land designated as Multiple-Use Class L (Limited Use) within the CDCA Plan. The Plan allows the construction of solar power projects within Class L areas. However, BLM would have to amend the CDCA Plan to identify the specific use of this site for the ISEGS facility prior to approving the right-of-way grant.

Under BLM regulations under 43 CFR 2805, the right-of-way grant would authorize project activities only on the described lands included within the boundaries of the grant.

Conduct of project-related activities on land which is not included within the right-of-way grant boundaries would be considered a substantial deviation and would require supplemental authorization in the form of an amendment to the right-of-way grant. Unauthorized disturbances outside the right-of-way would constitute trespass as identified in 43 CFR 2808, and would constitute an adverse impact under NEPA.

4.6.2.1 Proposed Project

Because land use impacts are associated with the occupation of the land area by the facility, separation of impacts into construction, operations, and closure/decommissioning components is not applicable. Therefore, these components are combined for the following analysis.

In accordance with 43 CFR §1610.5-3, all actions on public lands must be in conformance with applicable BLM land use plans. Any proposals or actions determined not to be in conformance with these plans would require the analysis of a land use plan amendment. The CDCA Plan states, "Sites associated with power generation or transmission not identified in the Plan will be considered through the Plan Amendment process". Because the existing BLM CDCA Plan does not specifically identify the ISEGS facility, BLM would have to amend the CDCA plan prior to approving the proposed right-of-way grant. The amendment decision would be part of the BLM Record of Decision for the issuance of a right-of-way grant and would occur after the Final EIS. Prior to issuance of any right of way grant, the project owner would be required to submit a final Plan(s) of Development that describes in detail the construction, operation, maintenance, and termination of the right-of-way and its associated improvements and/or facilities in accordance with mitigation measure **LAND-1**. **LAND-1** would also require the project owner to establish a bond for removal of all improvements and restoration of the right-of-way upon site closure.

As presented in the applicant's Revised Project Description (CH2M Hill 2009a), some project-related activities would occur outside of the proposed boundaries of the right-of-way grant. The acreage associated with these activities, and their technical scope, is not currently defined. In some areas (the perimeter in Ivanpah 1 and the southern and western boundaries of Ivanpah 3), all activities proposed to occur outside of the security fence would occur outside of the proposed right-of-way grant. In other areas, a buffer between the security fence and the right-of-way boundary is proposed, but may not be large enough to accommodate some of the described activities (such as new stormwater drainage structures). This use of land that is not authorized under the proposed right-of-way grant could not be considered without a supplemental analysis and subsequent amended right-of-way grant. Because the extent of proposed uses outside the boundaries of the right-of-way is not defined, and are not included within the right-of-grant application, unauthorized use of these lands could potentially result in direct, adverse impacts to land use under NEPA. In addition, impacts on other resources associated with the proposed activities on these lands are not evaluated within the EIS. Therefore, unauthorized use of the lands may have additional impacts that cannot currently be evaluated. To mitigate and address these potential impacts, mitigation measures **LAND-2** would ensure that all proposed project activities occur within the boundaries of the right-of-way grant.

The California Desert Conservation Area Plan

The CDCA was designated by Congress in 1976 through the FLPMA and covers 25 million acres of land. For lands under the jurisdiction of the BLM, land use planning guidance for the area is found in the CDCA Plan of 1980, as amended. The FLPMA provides that the public lands in the California desert be managed within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality.

Land Use Classification

The ISEGS site includes areas in the CDCA that are designated Multiple Use Class L (Limited Use). According to BLM's CDCA, Multiple-Use Class (MUC) L protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated MUC L are managed to provide lower-intensity, carefully controlled multiple use of resources while ensuring that sensitive values (cultural, scenic, biological resource) are not significantly diminished. The CDCA Plan identifies the following guidelines (permitted uses) for MUC L lands in relation to the proposed ISEGS project:

- Solar facilities may be allowed after NEPA requirements are met; and
- Distribution Facilities - New distribution facilities may be allowed and will be placed underground where feasible except where this would have greater impacts than a surface facility and within existing rights-of-way where available

Utility Corridors

The Energy Production and Utility Corridors Element of the CDCA Plan includes the full implementation of a network of planning corridors to meet the projected utility needs to the year 2000, the identification of environmental constraints and siting procedures, and the identification of potential sites for geothermal development, wind energy parks, and power plants. Sixteen planning corridors were identified in the CDCA Plan, and the proposed ISEGS site is located near the junction of, and partially overlaps, two designated Utility Corridors (D and BB). The corridors are intended to include new electrical transmission lines of 161 kV or above, all pipelines with diameters greater than 12 inches, cables for interstate communications, and major aqueducts or canals for inter-basin transfers of water. The corridors vary in width from two to five miles.

Approximately 50 percent of the land area for Ivanpah 1, 2, and 3 and the administrative complex/logistics area are located within existing Utility Corridors D and BB. The land area for Ivanpah 3 would cover approximately 60% of the 2-mile width of Corridor D. Although the proposed ISEGS facility would result in limiting the available area within Corridor D, future linear facilities could still be placed in the remaining portion of this corridor.

For a short distance, Utility Corridor BB is split into a northern and southern portion, and the ISEGS site sits within the area between the southern and northern portions. The northern portion of corridor BB passes between Ivanpah 1 and 2, and the southern portion of Utility Corridor BB passes just south of Ivanpah 1. Construction of Ivanpah 1 would cover a small fraction (less than 5%) of the southern portion of Utility Corridor BB, and would not substantially limit future use of this portion of the corridor for other purposes. However, construction of Ivanpah 1, 2, and the construction logistics area would cover 100% of the two-mile width of the northern portion of Utility Corridor BB. This may result in eliminating potential future uses of this portion of Utility Corridor BB for linear right-of-way projects because buried or overhead utilities could not be constructed across heliostat fields without removing heliostats. It is possible that provision could be made for future linear right-of-way grants through the ISEGS logistics area without disturbing heliostat fields, but such a grant would be limited by the narrow width available within the corridor at that location, and by the need to avoid disturbance of the new Ivanpah Substation and ISEGS administrative facilities. The 100% loss of Utility Corridor BB as attributable to ISEGS would be an adverse direct impact; however, that impact would be considered minimal since there would be some remaining opportunity to route future utility lines through the construction logistics area in Corridor BB and through remaining portions of Corridor D. It is foreseeable that several of the other potential generators in the vicinity of the Ivanpah Substation may need to locate generation tie lines into the Ivanpah Substation and this is achievable given the layout and temporary nature of most of the facilities in the construction logistics area.

Closure and Decommissioning

Following the operational life of 50 years, the project owner would perform site closure activities to meet federal and state requirements for the rehabilitation and revegetation of the project site after decommissioning. The procedures to be used for project decommissioning and restoration are defined in the applicant's Closure, Revegetation, and Rehabilitation Plan, Revision 3 (CH2M Hill 2010). Under this plan, the all aboveground structures and facilities would be removed. Areas that had been graded would be restored to original contours.

Similar to project construction and facility operations, decommissioning would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable laws and regulations and would avoid direct, adverse impacts. Upon decommissioning, no further discretionary actions would be required by the BLM. It is possible that after on-site rehabilitation and revegetation have occurred, the land may be used again for multiple uses such as mining, grazing, recreation, or open space.

Beneficial Impacts

The proposed project would not provide any beneficial impacts associated with land use.

4.6.2.2 Mitigated Ivanpah 3 Alternative

Because land use impacts are associated with the occupation of the land area by the facility, separation of impacts into construction, operations, and closure/decommissioning components is not applicable. Therefore, these components are combined for the following analysis.

The land use impacts resulting from the Mitigated Ivanpah 3 Alternative would be the same as those associated with the proposed project. Like the proposed project, the Mitigated Ivanpah 3 Alternative would be in conformance with the CDCA Plan and its amendments, but would require a new CDCA Plan amendment to identify the ISEGS site as a component of the plan. The only difference between the two alternatives would be the description of the acreage that is identified to be occupied by the facility in the Plan amendment.

The impact of the Mitigated Ivanpah 3 Alternative on designated utility corridors would be similar to, but smaller than, that resulting from the proposed project. Like the proposed project, the Mitigated Ivanpah 3 Alternative would occupy portions of both the BB and D corridors, thus reducing the land area within those corridors available for other non-ISEGS utility uses. However, the Mitigated Ivanpah 3 Alternative would occupy a much smaller portion of corridor D. In the proposed project, the northern portion of Ivanpah Unit 3 is entirely located within corridor D, and the proposed project restricts the width of corridor D from two miles to approximately 0.8 miles. In the Mitigated Ivanpah 3 Alternative, 100 percent of the 433-acre area eliminated from use would be removed from corridor D. In this alternative, the width of corridor D would be reduced from 2 miles to approximately 1.2 miles. Therefore, the impact on the corridor in Mitigated Ivanpah 3 Alternative would be reduced from that in the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with land use.

4.6.2.3 Modified I-15 Alternative

The land use impacts resulting from the Modified I-15 Alternative would be the same as those associated with the proposed project. Like the proposed project, the Modified I-15 Alternative would be in conformance with BLM land use plans, including the CDCA Plan and its amendments, but would require a new CDCA Plan amendment to identify the ISEGS site as a component of the plan. The only difference between the two alternatives would be the description of the acreage that is identified to be occupied by the facility in the Plan amendment.

The impact of the Modified I-15 Alternative on designated utility corridors would be similar to, but different than, that resulting from the proposed project. Like the proposed project, the Modified I-15 Alternative would occupy portions of the BB corridor, thus reducing the land area within that corridor available for other non-ISEGS utility uses. However, the Modified I-15 Alternative would not occupy any of corridor D. Therefore, there would be no impact on corridor D, as there would be in the proposed project and the Mitigated Ivanpah 3 Alternative.

Although the reconfiguration of Ivanpah Unit 3 would eliminate the impact to corridor D, it would create an impact to corridor B, which comprises a two-mile wide strip centered on Interstate 15. By being placed directly adjacent to Interstate 15, the Modified I-15 Alternative would occupy the entire width of corridor B on the western side of Interstate 15. The portion of corridor B on the eastern side of Interstate 15 would remain unaffected.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with land use.

4.6.2.4 No Action Alternative

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

- The results of the No Action Alternative would be the following:
- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and the site could be considered for another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

4.6.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

In accordance with Title 43, Code of Federal Regulations §1610.5-3, all actions on public lands must be in conformance with applicable BLM land use plans. Any proposals or actions determined not to be in conformance with these plans would require the analysis of a land use plan amendment. Although the CDCA Plan allows the construction of solar power plant projects within Multiple-Use Classes L, it also requires that new sites that are not currently included within the plan be added to the Plan through the Plan Amendment process. Therefore, this Environmental Impact Statement also acts as the mechanism for analyzing a Plan Amendment that adds the ISEGS site to the Plan. The Plan Amendment decision would be part of the BLM Record of Decision for the issuance of a right-of-way grant, and would occur after publication of the Final Environmental Impact Statement.

The proposed project, as described in the applicant's Revised Project Description (CH2M Hill 2009a), would not comply with BLM right-of-way regulations in 43 CFR 2800. As currently proposed, the project would include a variety of activities on public lands that are not included within the right-of-way grant. To address this, mitigation measure **LAND-2** would require that all proposed project activities occur within the boundaries of the right-of-way grant.

4.6.4 Mitigation Measures

LAND-1 The project owner shall obtain a ROW Grant from the BLM. Among the conditions for obtaining the ROW grant, the applicant shall provide the following:

A. Prior to issuance of any right of way grant, the project owner shall submit a final Plan(s) of Development that describes in detail the construction, operation, maintenance, and termination of the right-of-way and its associated improvements and/or facilities. The project owner shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the final approved Plan of Development. The degree and scope of these plans will vary depending upon (1) the complexity of the right-of-way or its associated improvements and/or facilities, (2) the anticipated conflicts that require mitigation, and (3) additional technical information required by BLM's Authorized Officer and the CPM. The plans will be reviewed, and if appropriate, modified by the project owner until acceptable, and approved by BLM's Authorized Officer and the CPM. An approved Plan of Development shall be made a part of the right-of-way grant. Any relocation, additional construction, or use that is not in accord with the approved Plan(s) of Development, shall not be initiated without the prior written approval of BLM's Authorized Officer and the CPM.

B. A bond, acceptable to BLM's Authorized Officer, shall be furnished by the project owner prior to the issuance of a Notice to Proceed with construction or at such earlier date as may be specified by BLM's Authorized Officer. The amount of this bond shall be determined by BLM's Authorized Officer. This bond must be maintained in effect until removal of improvements and restoration of the right-of-way have been accepted by BLM's Authorized Officer and the CPM.

Verification: At least 30 days prior to the start of construction and prior to any Notice to Proceed with construction issued by BLM's Authorized Officer and the CPM, the project owner shall provide BLM's Authorized Officer and the CPM with documentation of the following:

A. BLM's ROW Grant and final approved Plan of Development;

B. The bond satisfactory to BLM's Authorized Officer;

C. Certification that the project owner acknowledges that the ISEGS development and all related construction, operation, maintenance and closure activities are to be conducted in conformance with the approved Plan of Development and within the approved ROW boundaries for the life of the project.

LAND-2 The project owner shall allow a setback between the (1) security and tortoise exclusion fence, and (2) the proposed ROW boundary. Once the fencing is constructed, all inspection, monitoring, and maintenance activities required outside of the fencing will occur on lands included within this setback area.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall provide BLM's Authorized Officer and the CPM with a revised project description and construction plans specifying the inclusion of a setback area. The setback area shall be a minimum 20 feet wide within the ROW boundaries between the tortoise fence and the ROW boundary on the upslope boundary of the ROW, and a minimum 8-12 foot wide between the tortoise fence and ROW boundary on side and down slope boundaries. The project owner shall also provide BLM's Authorized Officer and the CPM with certification acknowledging that the ISEGS development and all related construction, operation, maintenance and closure activities are to be conducted within the ROW boundaries for the life of the project.

4.6.5 Summary

The criteria for evaluating Land Use impacts include an assessment of whether a proposed project will conflict with any applicable land use plan. The key land use plan affecting this project is the BLM's CDCA Plan of 1980, as amended (BLM 1980). In the CDCA Plan, the location of the proposed ISEGS facility includes land that is classified as Multiple-Use Class L (Limited Use). The Plan states that solar power facilities may be allowed within Limited Use areas after NEPA requirements are met. This Environmental Impact Statement acts as the mechanism for complying with those NEPA requirements.

Because solar power facilities are an allowable use of the land as it is classified in the CDCA Plan, the proposed action does not conflict with the Plan. However, the Plan also requires that newly proposed power sites that are not already included within the Plan be added to the Plan through the Plan Amendment process. The ISEGS site is not currently included within the Plan, and therefore a Plan Amendment is required to include the site as a recognized element with the Plan. The proposed Plan Amendment, and the corresponding analysis of the proposed Plan Amendment with respect to the analysis requirements contained within Chapter 7 of the Plan, is provided within Section 2 of this Environmental Impact Statement. The amendment decision would occur after publication of the Final Environmental Impact Statement.

Large portions of the land area for Ivanpah 1, 2, and 3 and the administrative complex/logistics area are located within existing Utility Corridors D and BB. The land area for Ivanpah 3 would cover approximately 60% of the 2-mile width of Corridor D. Although the land area for Ivanpah 1 and 2, and the logistics construction area overlap and would limit much of the available area within Corridor BB, future linear facilities could still be routed through the portions of Corridor BB that are within the temporary construction logistics area that will only be used during the construction phase of the project.

The use of land associated with the ISEGS project would combine with impacts of present and reasonably foreseeable projects to result in a cumulative reduction in available land uses within the Ivanpah Valley area, and in the region.

Overall, the land use impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those associated with the proposed project due to the reduced acreage that would be removed from other potential land uses.

Table 4.6-3
Comparison of Land Use Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Conformance with BLM land use plans (CDCA Plan, and others)	Conforms, with proposed Plan Amendment	Conforms, with proposed Plan Amendment	Conforms, with proposed Plan Amendment	Conforms, no Plan Amendment necessary
Interference with designated utility corridors	Interferes with portions of corridors BB and D, but does not eliminate their use	Lower than proposed project, higher than No Action	Impact on corridor D removed, but impact on corridor B added. Higher than No Action	No potential impact
Contribution to cumulative reduction in other land uses	Contributes incrementally to reduction in land use in Ivanpah Valley, and southern California desert	Reduced by 12.5 percent from proposed project, higher than No Action.	Slightly reduced from proposed project, higher than No Action.	No potential impact

4.7 Noise and Vibration

Introduction

The construction and operation of any power plant creates noise, or unwanted sound. The character and loudness of this noise, the times of day or night at which it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause direct, adverse environmental impacts. In some cases, vibration may be produced as a result of power plant construction practices, such as blasting or pile driving. The groundborne energy of vibration has the potential to cause structural damage and annoyance.

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the ISEGS and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws and regulations, and to avoid creation of direct, adverse noise or vibration impacts. For an explanation of technical terms and acronyms employed in this section, please refer to **Appendix B - Noise**.

Resource-Specific Project Description

Noise and vibration sources associated with construction of the proposed project would include operation of heavy equipment, potential pile driving, and steam blows associated with construction of the steam turbine system. The primary noise sources associated with operations would include the steam turbine generators, boiler feed pumps, transformers, the auxiliary boilers, and the air-cooled condenser fans (CH2M Hill 2007, AFC Table 5.7-7).

Applicable Laws, Regulations, and Supplemental Authorities

Table 4.7-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law	Description
Federal (OSHA):	
29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure
State (Cal/OSHA):	
Cal. Code Regs., tit. 8, §§ 5095–5099	Protects workers from the effects of occupational noise exposure
Local	
San Bernardino County General Plan Noise Element	Establishes noise limits as specified in the Development Code (below)
San Bernardino County Development Code, Ch. 83.01	Establishes property line noise limits for various receiving uses. Exempts construction noise during certain hours. Establishes vibration limits. The San Bernardino County General Plan is not applicable to projects located on Federal lands.

Federal

Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations designed to protect workers against the effects of occupational noise exposure (29 CFR § 1910.95). These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **Appendix B - Noise, Table A4**). The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

There are no federal laws governing off-site (community) noise.

The only guidance available for evaluation of power plant vibration is guidelines published by the Federal Transit Administration (FTA) for assessing the impacts of groundborne vibration associated with construction of rail projects. These guidelines have been applied by other jurisdictions to assess groundborne vibration of other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from groundborne vibration. The FTA measure of the threshold of perception is 65 VdB,[23] which correlates to a peak particle velocity of about 0.002 inches per second (in/sec). The FTA measure of the threshold of architectural damage for conventional sensitive structures is 100 VdB, which correlates to a peak particle velocity of about 0.2 in/sec.

State

California Government Code section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its General Plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

The California Occupational Safety and Health Administration (Cal/OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, §§ 5095–5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards (see Section 4.15 of this document, and **Appendix B - Noise, Table A4**).

Local

San Bernardino County General Plan Noise Element

The San Bernardino County General Plan Noise Element establishes noise performance standards for stationary sources. These limits are those specified in the San Bernardino County Development Code (below).

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[23] VdB is the common measure of vibration energy.

San Bernardino County Development Code

Chapter 83.01 of the San Bernardino County Development Code sets noise performance standards for noise from stationary noise sources measured at the boundaries of noise-sensitive land uses. These limits are reproduced here as **Table 4.7-2**.

Table 4.7-2
Noise Standards for Stationary Noise Sources

Noise Level (dBA L_{eq})		
Receiving Land Use Category	7:00 a.m. to 10:00 p.m.	**10:00 p.m. to 7:00 a.m.**
Residential	55	45
Professional Services	55	55
Other Commercial	60	60
Industrial	70	70

Source: COSB 2007a, Ch. 83.01, Table 83-2

Construction noise is exempt from these limits between the hours of 7:00 a.m. and 7:00 p.m. except Sundays and federal holidays (COSB 2007a, § 83.01.080[g][3]). Vibration is limited to that which cannot be felt without the aid of instruments at or beyond the lot line, and that which does not produce a particle velocity greater than or equal to 0.2 inches per second at the lot line (COSB 2007a, § 83.01.090[a]). Construction vibration is exempt from this limit between the hours of 7:00 a.m. and 7:00 p.m. except Sundays and federal holidays (COSB 2007a, § 83.01.090[c][2]).

Note that, since the project will be built on federally owned land, these San Bernardino County laws and regulations do not apply. They are listed here solely as guidelines.

4.7.1 Affected Environment

The ISEGS would be constructed on 4,073 acres of federally owned land administered by the BLM in San Bernardino County. The site lies approximately 4.5 miles southwest of Primm, Nevada and 3.1 miles west of the Nevada border, in an area designated compatible with solar energy development in the California Desert Conservation Area Plan. The Primm Valley Golf Club lies approximately 0.5 mile northeast of the eastern boundary of Ivanpah I. The project vicinity consists of BLM-managed open space (CH2M Hill 2007, AFC § 5.7.4). The nearest human occupancy is the Primm Valley Golf Club.

Ambient Noise Monitoring

Ambient noise monitoring was not required for the ISEGS project, since Energy Commission regulations require such monitoring only when facilities where quiet is an important attribute of the environment would be impacted by the project (20 CCR, Chapter 5, Article 6, Appendix B, § [g][4][A]). The community of Primm, Nevada, 4.5 miles distant, is too far from ISEGS to be affected by project noise. The Primm Valley Golf Club golf course is considered a less noise-sensitive land use.

4.7.2 Environmental Consequences

Methodology

An adverse impact from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local General Plan or noise ordinance or applicable standards of other agencies;
2. exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

For this project, a potential for an adverse noise impact exists where the noise of the project plus the background exceeds the background by 5 dBA or more at the nearest sensitive receptor, including those receptors that are considered minority population.

It is reasonable to assume that an increase in background noise levels up to 5 dBA in a residential setting would not be adverse; an increase of more than 10 dBA would be adverse. An increase between 5 and 10 dBA may or may not be considered adverse, depending on the particular circumstances of the case.

Factors to be considered in evaluating adverse impacts as defined above include:

1. the resulting combined noise level;[24]
2. the duration and frequency of the noise;
3. the number of people affected;
4. the land use designation of the affected receptor sites; and
5. public concern or controversy as demonstrated at workshops or hearings or by correspondence.

Noise due to construction activities would be considered to be not adverse if:

- the construction activity is temporary;
- use of heavy equipment and noisy activities is limited to daytime hours; and
- all industry-standard noise abatement measures are implemented for noise-producing equipment.

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[24] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments and with industrial noise regulations adopted by European jurisdictions. If the project would create an increase in ambient noise no greater than 10 dBA at nearby sensitive receptors, and the resulting noise level would be 40 dBA or less, the project noise level would likely be insignificant.

BLM uses the above method and threshold to protect the most sensitive populations, including the minority population.

4.7.2.1 Proposed Project

Construction Impacts

Construction noise is usually considered a temporary phenomenon. Construction of the ISEGS is expected to last a total of 48 months (CH2M Hill 2007, AFC § 1.4). While this is considerably longer than is typical for a power plant, construction noise would not likely cause annoyance.

Power Plant Site

To evaluate construction noise impacts, BLM typically compares the projected noise levels to the ambient. Since construction noise typically varies continually with time, it is most appropriately measured by, and compared to, the Leq (energy average) metric. In the case of ISEGS, however, since the nearest potential sensitive noise receptors are so distant, such comparison is not required.

Construction noise may be expected to reach levels 34 dBA Leq in Primm (CH2M Hill 2007, Table 5.7-6). Such a noise level would generally be unnoticeable in a typical community environment and would not represent an adverse impact. Further, the projected levels are conservative, based on surveys of construction equipment taken 30 years ago. Modern construction equipment is quieter, so actual noise levels should be less than predicted. Since noisy construction work would be restricted to daytime hours, it would likely be unnoticeable in Primm.

Construction noise could reach levels of 50 dBA Leq at the golf course (CH2M Hill 2007, Table 5.7-6 and agency calculations). Such levels would not likely be annoying to golfers; therefore, no direct, adverse impact would be expected.

In the event that actual construction noise should annoy anyone, mitigation measures **NOISE-1** and **NOISE-2** would establish a notification process to make people aware of the project, and a noise complaint process that would require the applicant to resolve any problems caused by noise from the project.

Construction Impact on Mojave National Preserve

The nearest boundary of the MNP is located approximately 2.2 miles from the proposed location of the nearest project power block (Ivanpah 3). The applicant predicts a construction noise level of 83 dBA L_{eq} at 50 feet. This would result in a construction noise level of roughly 40 dBA L_{eq} at the MNP. A level of 40 dBA does not typically cause annoyance. Also given that construction would be limited to daytime, construction will be temporary, and the human activities in the preserve are for limited, short-term durations, only minimal direct, adverse construction impacts would be expected.

Linear Facilities

Linear facilities would include 5.3 miles of natural gas pipeline, a pipeline to supply well water, and electrical transmission lines interconnecting to the new Southern California Edison Ivanpah substation. With the exception of 0.5 mile of gas pipeline and 570 feet of water line, all linears would lie within the project site, so their construction noise impacts would be similar to those of the power plant itself (CH2M Hill 2007, AFC §§ 1.2, 1.5, 2.1, 2.2.2, 2.2.6, 2.2.7, 4.1, 5.7.1). Limiting noisy construction to daytime hours, as required in mitigation measure **NOISE-6**, should provide adequate mitigation of impacts.

Pile Driving

The applicant has not yet determined whether pile driving would be required, but predicts that the noise from pile driving could be expected to reach nearly 50 dBA at Primm, a distance of 4.5 miles (CH2M Hill 2007, AFC Table 5.7-6). This level would likely not prove annoying during the daytime. Pile driving noise could also approach 58 dBA at the golf course. Again, this level would likely not prove annoying to golfers. To ensure that pile driving noise does not cause annoyance, mitigation measure **NOISE-6** would limit pile driving to the hours between 7:00 a.m. and 7:00 p.m.

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feed water and steam systems, the piping and tubing that comprise the steam path have accumulated dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. Traditionally, high pressure steam is then raised in the boiler or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a *high pressure steam blow*, is quite effective at cleaning out the steam system. A series of short steam blows, lasting two or three minutes each, is performed several times daily over a period of two or three weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation. Alternatively, high pressure compressed air can be substituted for steam.

High pressure steam blows, if unsilenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet; this would amount to roughly 95 dBA at the Primm Valley Golf Course and roughly 76 dBA at Primm, Nevada. With a silencer installed on the steam blow piping, noise levels are commonly attenuated to 89 dBA at 50 feet; this would yield approximately 55 dBA at the golf course and 36 dBA at Primm.

No laws and regulations would prohibit the noise from an unsilenced high pressure steam blow, but the San Bernardino County Development Code, were it applicable, would limit such noisy construction work to the hours between 7:00 a.m. and 7:00 p.m. This level of noise, however, would be extremely annoying at the golf course and would likely be extremely annoying in Primm. A silenced blow would not likely be annoying at the golf course and would likely be unnoticeable in Primm.

A newer, quieter steam blow process, referred to as *low pressure steam blow* and marketed under names such as QuietBlow^{TM} or Silentsteam^{TM}, has become popular. This method utilizes lower pressure steam or compressed air over a continuous period of approximately 36 hours. Resulting noise levels reach about 80 dBA at 100 feet; such a process would yield noise levels at the golf course of approximately 52 dBA and 33 dBA at Primm.

Nighttime noise from a low pressure continuous steam blow at Primm would not likely disturb people trying to sleep and adverse impacts would not be expected. Nighttime noise at the golf course is irrelevant and thus would not be likely to cause adverse impacts.

The applicant submitted comments on BLM's DEIS (CH2M Hill 2009j, Comment 100) requesting more flexibility in controlling noise from steam blows. Specifically, the applicant requested that steam blows be allowed to produce noise levels at the golf course of 60 dBA, and at Primm of 55 dBA daytime and 45 dBA nighttime. In response to this request, mitigation measure **NOISE-7** has been modified accordingly.

Impact of Steam Blows on Mojave National Preserve

The nearest boundary of the National Preserve is located approximately 2.2 miles from the proposed location of the nearest project power block (Ivanpah 3). Unsilenced high pressure steam blow would amount to roughly 70 dBA at Primm. With a silencer installed on the steam blow piping, noise level would yield approximately 55 dBA at the golf course. This level of noise would not be annoying. Also, steam blow is temporary and typically occurs only once during the life of a power plant project. Thus, a silenced steam blow would not be expected to create adverse impacts to the National Preserve. To ensure this, mitigation measure **NOISE-7** that limits steam blow noise to 55 dBA at this location.

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving, should it be employed. Vibration attenuates rapidly; it is likely that no vibration would be perceptible at any appreciable distance from the project site. Therefore, there would be no direct, adverse impacts from construction vibration.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized those applicable laws and regulations that would protect construction workers (CH2M Hill 2007, AFC § 5.7.5.2.1). To ensure that construction workers would, in fact, be adequately protected, mitigation measure **NOISE-3** would require a noise control program.

Operation Impacts

BLM compares the projected noise with applicable laws and regulations. In addition, BLM evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any direct, adverse impacts.

The applicant proposes to mitigate power plant noise by specifying and purchasing major plant equipment that conforms to OSHA guidelines. That is, noise levels from such equipment would not exceed 85 to 90 dBA at a distance of 3 feet in order to protect workers' hearing. With such mitigation, the applicant predicts that noise from the operating power plant would not exceed 30 dBA in Primm and 55 dBA at the golf course (CH2M Hill 2007, AFC § 5.7.5.3.2; Table 5.7-7).

Project operating noise in Primm is predicted not to exceed 30 dBA Leq. This figure is considerably quieter than required by the San Bernardino County laws and regulations, which would limit project noise in Primm to 55 dBA during the daytime and 45 dBA at night (see **Table 4.7-2**, above). Even though these limits do not apply since the project would be built on federally owned land, mitigation measure **NOISE-4** would require noise restrictions, and thus ensure compliance with this standard.

Plant operating noise is likewise predicted not to exceed 55 dBA at the golf course. As discussed above, no numerical law and regulation limits apply. Nevertheless, this noise level can be best compared to the San Bernardino County Development Code limit for "Other Commercial" land uses, or 60 dBA day or night (see **Table 4.7-2**, above). Mitigation measure **NOISE-4** would ensure compliance.

Power Plant Noise

Power plant noise is unique. Essentially, a power plant operates as a steady, continuous, broadband noise source, unlike the intermittent sounds that comprise the majority of the noise environment. As such, power plant noise contributes to, and becomes part of, the background noise level, or the sound heard when most intermittent noises cease. Where power plant noise is audible, it tends to define the background noise level. For this reason, BLM typically compares the projected power plant noise to the existing ambient background (L90) noise levels at the affected sensitive receptors. If this comparison identifies a direct, adverse impact, then feasible mitigation must be incorporated in the project to reduce or remove the impact.

In many cases, a power plant is intended to operate around the clock for much of the year. The applicant explains, however, that the ISEGS would operate only during the daytime hours, typically 14 hours per day, when sufficient solar insolation is available (CH2M Hill 2007, AFC §§ 1.2, 2.1, 2.2.2, 2.2.16, 5.7.5.3). BLM typically evaluates project noise emissions by comparing them to the nighttime ambient background level; this assumes the potential for annoyance due to power plant noise is greatest at night when residents are trying to sleep. Nighttime ambient noise levels are typically lower than the daytime levels; differences of 5 to 10 dBA are common. It is prudent to average the lowest nighttime hourly background noise level values to arrive at a reasonable baseline for comparison with the project's predicted noise level.

As discussed above, since the ISEGS is not expected to impact any sensitive noise receptors, an ambient noise survey was neither required nor conducted. Therefore, the usual method of evaluating noise impacts must be modified. As discussed above, the project is expected to produce noise levels in Primm, the nearest sensitive noise receptor, of 30 dBA Leq. This level is below what one would expect in any urban daytime environment, no matter how small the town (Primm's population is 436) (CH2M Hill 2007, AFC § 5.7.4). Since the project would not operate at night, it could not produce noise impacts in Primm during the nighttime except potentially from mirror washing. To ensure this predicted noise level would not be exceeded, mitigation measure **NOISE-4** would require noise restrictions.

Operation Impact on Mojave National Preserve

The nearest boundary of the National Preserve is located approximately 2.2 miles from the proposed location of the nearest project power block (Ivanpah 3). The applicant predicts an operational noise level of 55 dBA L_{eq} at the golf course (approximately 0.5 mile from the boundary of Ivanpah I. This would result in roughly 45 dBA L_{eq} at the nearest edge of the Mojave National Preserve to the project site. A level of 45 dBA does not typically cause annoyance. Thus, the operation impact would not be likely to cause direct, adverse impacts. Note that the impact is less recognized since the visitors of the Mojave National Preserve would not have the same level of sensitivity to project noise as more noise sensitive receptors such as residential receptors; human activities in the preserve are for limited, short-term durations.

Tonal Noises

One possible source of annoyance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. The applicant plans to avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design (CH2M Hill 2007, AFC § 5.7.5.3.3). To ensure that tonal noises would not cause annoyance, mitigation measure **NOISE-4** would require noise restrictions.

Linear Facilities

All water and gas piping lie underground and would be silent during operation. Noise effects from the electrical interconnection line typically do not extend beyond the right-of-way easement of the line and would thus be inaudible to any receptors (CH2M Hill 2007, AFC § 5.7.5.3.5).

Vibration

Vibration from an operating power plant could be transmitted by two chief means; through the ground (groundborne vibration) and through the air (airborne vibration).

The operating components of the ISEGS plant would consist of high-speed steam turbine generators and various pumps and fans. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors would be attached to the turbines and generators. Based on experience with numerous previous projects employing similar equipment, groundborne vibration from the ISEGS would be undetectable by any likely receptor. Although the San Bernardino County Development Code's limit on vibration is not applicable to this project on federal land, the ISEGS would be in compliance.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. None of the project equipment is likely to produce low frequency noise; this makes it highly unlikely that the ISEGS would cause perceptible airborne vibration effects.

Worker Effects

The applicant has acknowledged the need to protect plant operating and maintenance workers from noise hazards and has committed to comply with applicable laws and regulations (CH2M Hill 2007, AFC § 5.7.5.3.1). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required. Mitigation measure NOISE-5 would ensure that plant operation and maintenance workers would be adequately protected.

Closure and Decommissioning

In the future, upon closure of the ISEGS, all operational noise from the project would cease, and no further adverse noise impacts from operation of the ISEGS would be possible. The remaining potential temporary noise source would be the dismantling of the structures and equipment and any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it can be treated similarly. That is, noisy work could be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise laws and regulations that were in existence at that time would apply. Applicable mitigation measures included in BLM's decision would also apply unless modified.

Beneficial Impacts

The proposed project would not provide any beneficial impacts associated with noise and vibration.

4.7.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

The noise and vibrations resulting from the construction of the Mitigated Ivanpah 3 Alternative would be associated with the use of construction equipment, drilling rigs used to install heliostats, and steam blow testing of the steam turbine system. For the proposed project, the expected levels of noise and vibrations were evaluated, including the impact of these issues on offsite receptors, and there would be no impacts.

The construction of the Mitigated Ivanpah 3 Alternative would be expected to use the same types of equipment and testing procedures as the proposed project. The size of the boilers to be tested, and the number of heliostats to be installed, would be reduced from those in the proposed project. In addition, the duration of construction would be expected to be shorter for the Mitigated Ivanpah 3 Alternative, by approximately 17 percent. Therefore, the noise and vibration impacts associated with construction of the Mitigated Ivanpah 3 Alternative would be expected to be lower than those for the proposed project.

Operations Impacts

Noise and vibration sources associated with the operation of the Mitigated Ivanpah 3 Alternative would include the rotation of the steam turbine generators, flow of fluids (natural gas, water, and steam) through pipes, and the use of engines in equipment and vehicles. For the proposed project, the expected levels of noise and vibrations from these sources, including the impact of these issues on offsite receptors, were evaluated and there would be no impacts.

The noise and vibration source associated with operation of the Mitigated Ivanpah 3 Alternative would be the same as those for the proposed project. The size of some of the equipment and facilities associated with Ivanpah Unit 3, including the boiler, would be reduced from those in the proposed project. Therefore, the noise and vibration impacts associated with operation of the Mitigated Ivanpah 3 Alternative would be expected to be lower than those for the proposed project.

Closure and Decommissioning Impacts

The closure and decommissioning impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with the use of heavy equipment necessary to remove project-related structures, including removal of 173,500 heliostats. For the proposed project, noise and vibration sources would not result in any impacts. The closure and decommissioning of the Mitigated Ivanpah 3 Alternative would include the same type of equipment and activities, and therefore noise and vibration sources, as the proposed project. The primary difference would be that the duration of closure and decommissioning would be expected to be shorter for the Mitigated Ivanpah 3 Alternative, by approximately 17 percent. Therefore, noise and vibration impacts associated with closure and decommissioning of the Mitigated Ivanpah 3 Alternative would be lower than those associated with the proposed project, and therefore would not be expected to be adverse.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with noise and vibration.

4.7.2.3 Modified I-15 Alternative

Construction Impacts

The noise and vibrations resulting from the construction of the Modified I-15 Alternative would be associated with the use of construction equipment, drilling rigs used to install heliostats, and steam blow testing of the steam turbine system. For the proposed project, the expected levels of noise and vibrations, including the impact of these issues on offsite receptors, were evaluated and there would be no impacts.

The construction of the Modified I-15 Alternative would be expected to use the same types of equipment and testing procedures as the proposed project. The size of the boilers to be tested, and the number of heliostats to be installed, would be reduced from those in the proposed project. In addition, the duration of construction would be expected to be shorter for the Modified I-15 Alternative, by approximately 17 percent. Therefore, the noise and vibration impacts associated with construction of the Modified I-15 Alternative would be expected to be lower than those for the proposed project.

Operations Impacts

Noise and vibration sources associated with the operation of the Modified I-15 Alternative would include the rotation of the steam turbine generators, flow of fluids (natural gas, water, and steam) through pipes, and the use of engines in equipment and vehicles. For the proposed project, no impacts would result from the anticipated levels of noise and vibrations from these sources, including the impact of these issues on offsite receptors.

The noise and vibration source associated with operation of the Modified I-15 Alternative would be the same as those for the proposed project. The size of some of the equipment and facilities associated with Ivanpah Unit 3, including the boiler, would be reduced from those in the proposed project. Therefore, the noise and vibration impacts associated with operation of the Modified I-15 Alternative would be expected to be lower than those for the proposed project.

Closure and Decommissioning Impacts

The closure and decommissioning impacts resulting from the Modified I-15 Alternative would be associated with the use of heavy equipment necessary to remove project-related structures, including removal of 173,500 heliostats. For the proposed project, noise and vibration sources would not result in any impacts. The closure and decommissioning of the Modified I-15 Alternative would include the same type of equipment and activities, and therefore noise and vibration sources, as the proposed project. The primary difference would be that the duration of closure and decommissioning would be expected to be shorter for the Modified I-15 Alternative, by approximately 17 percent. Therefore, noise and vibration impacts associated with closure and decommissioning of the Modified I-15 Alternative would be lower than those associated with the proposed project, and therefore would not be expected to be adverse.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with noise and vibration.

4.7.2.4 No Action Alternative

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, which could include consideration of another solar project.

- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

4.7.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances. The San Bernardino County Development Code exempts all construction noise from numerical noise limits between 7:00 a.m. and 7:00 p.m. Monday through Saturday (see **Table 4.7-2**, above). Even though this law and regulation does not apply to construction on federal land, the applicant commits to complying with this restriction (CH2M Hill 2007, AFC § 5.7.7.3). Mitigation measure **NOISE-6** would ensure that noisy construction would be limited to these hours.

4.7.4 Mitigation Measures

NOISE-1 Prior to the start of ground disturbance, the project owner shall notify the operator of the Primm Valley Golf Course, by mail or other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project and include that telephone number in the above notice. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: At least 15 days prior to ground disturbance, the project owner shall transmit to BLM's Authorized Officer and the CPM a statement, signed by the project owner's project manager, stating that the above notification has been performed and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

Noise Complaint Process

NOISE-2 Throughout the construction (including the steam blow activities) and operation of the ISEGS, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- Use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to BLM's Authorized Officer and the CPM, to document and respond to each noise complaint;
- Attempt to contact the person(s) making the noise complaint within 24 hours;
- Conduct an investigation to determine the source of noise related to the complaint;
- Take all feasible measures to reduce the noise at its source if the noise is project related; and
- Submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts, and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to the complainant's satisfaction.

Verification: Within 5 days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form with BLM's Authorized Officer and the CPM, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 3-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

NOISE-3 The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval a noise control program and a statement, signed by the project owner's project manager, verifying that the noise control program will be implemented throughout construction of the project. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal/OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to BLM's Authorized Officer and the CPM the noise control program and the project owner's project manager's signed statement. The project owner shall make the program available to Cal/OSHA upon request.

Noise Restrictions

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that operation of the project will not cause noise complaints from residents of Primm, Nevada, or from the operator of the Primm Valley Golf Course or from visitors of the Mojave National Preserve. If legitimate project-related noise complaints are received from residents of Primm, the project owner shall perform a noise survey to demonstrate that noise levels due to plant operation do not exceed an average of 45 dBA L_{eq} measured at the nearest residence of the community of Primm, Nevada. If legitimate project-related noise complaints are received from the operator of the Primm Valley Golf Course or the visitors of the Mojave National Preserve, the project owner shall perform a noise survey to demonstrate that noise levels due to plant operation do not exceed an average of 55 dBA L_{eq} measured at the nearest boundary of the golf course or the nearest boundary of the Mojave National Preserve, respectively. No new project components creating pure-tone noises will be added to the project unless they are balanced by other plant features. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.

A. The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to BLM's Authorized Officer and the CPM, closer to the plant (e.g., 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected location. The character of the plant noise shall be evaluated at the affected residential locations to determine the presence of pure tones or other dominant sources of plant noise.

Verification: The survey shall take place within 30 days of the receipt of the noise complaint, unless the complaint has been resolved to the complaining party's satisfaction. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to BLM's Authorized Officer and the CPM. Included in the survey report will be a description of additional mitigation measures (if any) necessary to achieve compliance with the above-listed noise limit and a schedule, subject to BLM Authorized Officer and CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 15 days of completion of the new survey, the project owner shall submit to BLM's Authorized Officer and the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

NOISE-5 Following each phase (Ivanpah 1, Ivanpah 2, and Ivanpah 3) of the project's first achieving a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The surveys shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095–5099 and Title 29, Code of Federal Regulations section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare reports of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing each survey, the project owner shall submit the noise survey report to BLM's Authorized Officer and the CPM. The project owner shall make the reports available to OSHA and Cal/OSHA upon request.

Construction Time Restrictions

NOISE-6 Heavy equipment operation and noisy construction work that causes offsite annoyance as evidenced by the filing of a legitimate noise complaint shall be restricted to the 7:00 a.m. to 7:00 p.m. time period.

Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to BLM's Authorized Officer and the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

Steam Blow Restrictions

NOISE-7 If a high-pressure steam blow is employed, the project owner shall equip steam blow piping with a temporary silencer or take other effective measures that quiet the noise of steam blows to no greater than 60 dBA measured at the Primm Valley Golf Club and no greater than 55 dBA measured at any affected residential locations in Primm, NV, and to no greater than 55 dBA measured at the nearest boundary of the Mojave National Preserve. The project owner shall conduct high-pressure steam blows only during the hours of 7:00 a.m. to 7:00 p.m.

If a low-pressure continuous steam blow is employed, the project owner shall limit the noise of steam blows to no greater than 45 dBA measured at any affected residential location in Primm, NV. In lieu of specifying the level of silencing above, the project owner may alternatively submit an analysis to the BLM's Authorized Officer and the CPM that documents that during either high or low pressure steam blows, steam blow noise levels would not exceed 60 dBA at the Primm Valley Golf Club (daytime), or 55 dBA (daytime)/45 dBA (nighttime) at the nearest residential location in Primm.

Verification: At least fifteen (15) days prior to the first high pressure steam blow, the project owner shall submit to BLM's Authorized Officer and the CPM drawings or other information describing the temporary steam blow silencer or other noise attenuating measures to be taken, the noise levels expected and a description of the steam blow schedule.

At least fifteen (15) days prior to any low-pressure continuous steam blow, the project owner shall submit to BLM's Authorized Officer and the CPM drawings or other information describing the process, including the noise levels expected and the projected time schedule for execution of the process.

4.7.5 Summary

The proposed project, if built and operated in conformance with the proposed mitigation measures, would comply with all applicable noise and vibration laws and regulations for both operation and construction, and would produce no adverse noise impacts on people within the affected area, directly, indirectly, or cumulatively.

Overall, by following regulatory requirements and proposed mitigation measures, there would be no potential impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any hazards associated with noise and vibration would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration of construction and reduced acreage of operations.

Table 4.7-3
Comparison of Noise and Vibration Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Noise and vibration from construction sources	No adverse impact, could be mitigated.	Lower than proposed project, higher than No Action	Lower than proposed project, higher than No Action	No potential impact.
Noise and vibration from operations sources	No adverse impact, could be mitigated.	Lower than proposed project, higher than No Action	Lower than proposed project, higher than No Action	No potential impact.
Noise and vibration from decommissioning sources	No adverse impact, could be mitigated.	Lower than proposed project, higher than No Action	Lower than proposed project, higher than No Action	No potential impact.

4.8 Public Health and Safety

BLM has analyzed potential public health and safety risks associated with construction and operation of the ISEGS project and do not expect any adverse cancer or short- or long-term noncancer health effects from project toxic emissions. BLM's analysis of potential health and safety impacts from the proposed ISEGS uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of BLM's health risk assessment, emissions from the ISEGS would not contribute to morbidity or mortality in any age or ethnic group residing in the project area.

Introduction

The purpose of this section is to determine if emissions of toxic air contaminants (TACs) from the proposed ISEGS would have the potential to cause direct, adverse public health and safety impacts or to violate standards for public health protection. If potential health and safety impacts are identified, BLM will evaluate mitigation measures to avoid or minimize such impacts.

In addition to the analysis contained in this section that focuses on potential effects to the public from emissions of toxic air contaminants, other related aspects to the assessment of ISEGS' potential public health and safety impacts are considered elsewhere in this document as listed and briefly described as follows:

- Air Quality - evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the ISEGS project; Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established an ambient air quality standard to protect public health;
- Hazardous Materials Management - evaluates the potential impacts on public and worker health from accidental releases of hazardous materials;
- Socioeconomics and Environmental Justice - evaluates project-induced changes on community services including law enforcement and hospitals;
- Soil and Water Resources – evaluates the potential for ISEGS to cause contamination of soil and water resources, to exacerbate flooding, and to cause adverse effects to water supply in consideration of other existing users and projected needs;
- Traffic and Transportation – evaluates potential effects on roads used during project construction and operation, effects on traffic, and the potential for project-related glare to cause a health or safety hazard;
- Transmission Line Safety and Nuisance – evaluates potential effects associated with proposed transmission lines accounting for both the physical presence of the lines and the physical interactions of their electric and magnetic fields; The potential effects include aviation safety, interference with radio-frequency

communication, audible noise, fire hazards, hazardous shocks, nuisance shocks, and electric and magnetic field (EMF) exposure.

- Worker Safety and Fire Protection - assesses the worker safety and fire protection measures proposed by the applicant including determining whether the project would have any adverse impacts on fire protection and emergency medical services that are also relied upon by the public; and
- Waste Management - evaluates issues associated with wastes generated from the proposed project construction and operation including ensuring that wastes would be managed in an environmentally safe manner.

Resource-Specific Project Description

Emissions Sources

The emissions sources at the proposed ISEGS include three partial-load natural gas-fired steam boilers, three emergency diesel fire pumps, and three emergency diesel generators (one per plant). The partial-load steam boilers would be used during startup and periods of cloud cover, would be expected to average about 1 hour per day and not exceed 4 hours per day. Energy Commission Condition of Certification **AQ-SC10** would require that, on an annual basis, the partial-load steam boilers for each power plant would not exceed a total annual natural gas fuel heat input that is more than 5 percent of the total annual heat input from the sun. As noted earlier, the first step in a health risk assessment is to identify potentially toxic compounds that may be emitted from the facility. Since the facility uses dry cooling, there are no emissions of metals or volatile organic compounds from cooling tower mist or drift. Also, there is no hazard posed by the potential presence of Legionella bacteria.

Tables 5.9-2, 5.1-B6, and 5.1-B7 of the AFC list noncriteria pollutants that may be emitted from ISEGS boilers as combustion byproducts, along with their anticipated amounts (emission factors). Toxic Air Contaminant emission factors were obtained from the EPA AP-42 database of emission factors. Table 5.9-3 of the AFC lists toxicity values used to characterize cancer and noncancer health impacts from project pollutants. The toxicity values include Reference Exposure Levels, which are used to calculate short-term and long-term noncancer health effects, and cancer unit risks, which are used to calculate the lifetime risk of developing cancer, as published in the Office of Environmental Health Hazard Assessment (OEHHA) Guidelines (OEHHA 2003). **Table 4.8-1** lists the toxic emissions potentially emitted by the ISEGS and shows how each contributes to the health risk analysis.

Table 4.8-1
Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Benzene			✓	✓	✓
Diesel Exhaust			✓	✓	
Ethylbenzene				✓	
Formaldehyde			✓	✓	✓
Hexane				✓	
Napthalene		✓	✓	✓	
Polynuclear Aromatic Hydrocarbons (PAHs)	✓	✓	✓	✓	
Toluene				✓	✓

Source: OEHHA 2003, Appendix L and CH2M Hill 2007, Table 5.9-3

Applicable Laws, Regulations, and Supplemental Authorities

Table 4.8-2
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law	Description
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	This act requires new sources that emit more than 10 tons per year of any specified Hazardous Air Pollutant (HAP) or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology.
State	
California Health and Safety Code section 25249.5 et seq. (Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Prop 65 exposure warnings are required.
California Health and Safety Code section 41700	This section states that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Public Resource Code section 25523(a); Title 20 CCR section 1752.5, 2300–2309 and Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq.	These regulations require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more TACs.

Applicable Law	Description
Local	
Mojave Desert Air Quality Management District Regulation XIII Rule 1320	This rule requires a review of new or modified projects that emit toxic air contaminants and the preparation of a health risk assessment. A permit would not be issued if the risk were greater than 10 in 1 million or if the hazard index were greater than 1.0. It also requires the use of best available control of toxics.

4.8.1 Affected Environment

This section describes the environment in the vicinity of the proposed project site from the public health perspective. Characteristics of the natural environment, such as meteorology and terrain, affect the project's potential for causing impacts on public health. An emissions plume from a facility may affect elevated areas before lower terrain areas due to a reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts. Also, the types of land use near a site influence the surrounding population distribution and density, which, in turn, affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination. The area surrounding the project is rural and sparsely populated, primarily dedicated to agricultural uses.

Site and Vicinity Description

Land in the vicinity of the proposed project is designated for Class L Limited Use and Class M Moderate Use, which include a variety of industrial uses as well as agricultural and recreational uses (CH2M Hill 2007 section 5.6.3.2 and Table 5.6-4). The natural gas pipeline proposed for construction for this project would be approximately 5.3 miles long, running from the Kern River Gas Transmission Company (KRGT) pipeline through Ivanpah 3 and 2 and ending at Ivanpah 1 (CH2M Hill 2007 section 2.2.6). The nearest residence is located approximately 5 miles from the site in the community of Primm, Nevada. According to the AFC, there are no sensitive receptors within 6 miles of the project site (CH2M Hill 2007 section 5.9.3). However, BLM learned of a house trailer used as a residence that is located near the southeast quadrant of the Interstate 15/Yates Well Road interchange.

The ISEGS would have three exhaust stacks associated with the start-up boilers, one for each plant (Ivanpah 1, 2, and 3). The stack heights would be 39.62 meters (130 feet) (CH2M Hill 2007 Table 5.1D-2). The location of elevated terrain (above the stack height) is important in assessing potential exposure, as an emission plume may impact high elevations before impacting lower elevations. The site elevation ranges from 2,880 to 3,030 feet above sea level, and the topography in the immediate vicinity is generally flat. Terrain above stack height includes a volcanic rock structure rising to 3,160 feet above sea level approximately 0.8 miles east of the project site, and at 4 miles from the project site terrain in all directions (except southeast) rises to about 6,000 feet (CH2M Hill 2007 section 5.1.3.1).

Meteorology

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into ambient air as well as the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants and associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced, and localized exposure may be increased.

The Ivanpah Basin of the Mojave Desert is characterized by a desert climate. Summers are hot and dry and winters are moderate with an average annual rainfall of 2–5 inches. Winds generally flow west to east across the region (CH2M Hill 2007 section 5.1.3.2)

Atmospheric stability is a measure related to turbulence, or the ability of the atmosphere to disperse pollutants due to convective air movement. Mixing heights (the height above ground level through which the air is well mixed and in which pollutants can be dispersed) are lower during mornings due to temperature inversions and increase during the warmer afternoons. Section 4.1 presents more detailed meteorological data.

Existing Air Quality

The proposed site is within the jurisdiction of the MDAQMD. By examining average toxic concentration levels from representative air monitoring sites with cancer risk factors specific to each contaminant, lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. For comparison purposes, it should be noted that the overall lifetime cancer risk for the average individual in the United States is about 1 in 3, or 333,000 in 1 million.

There are no monitoring stations in San Bernardino County; therefore BLM was unable to determine background concentrations for the ISEGS site. The applicant noted that air quality data from the South Coast Air Basin (upwind from the project area) between the years 1990 and 2005 show a steady reduction in TAC emissions (CH2M Hill 2007 section 5.9.3).

The use of reformulated gasoline, beginning in the second quarter of 1996, as well as other toxics reduction measures, have led to a decrease of ambient levels of toxics and associated cancer risk during the past few years in all areas of the state and the nation. For example, in the San Francisco Bay Area, cancer risk was 342 in 1 million based on 1992 data, 315 in 1 million based on 1994 data, and 303 in 1 million based on 1995 data. In 2002, the most recent year for which data is available, the average inhalation cancer risk decreased to 162 in 1 million (BAAQMD 2004b, p. 12).

Existing Public Health Concerns

When evaluating a new project, BLM conducts a detailed study and analysis of existing public health issues in the project vicinity. This analysis is prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located near the proposed project. Assessing existing health concerns in the project area will provide BLM with a basis on which to evaluate the significance of any additional health impacts from the proposed ISEGS project and evaluate any proposed mitigation. No existing health issues have been reported within a 6-mile radius of the project.

4.8.2 Environmental Consequences

Methodology

This section discusses toxic emissions to which the public could be exposed during project construction, routine operation, and closure/decommissioning. Following the release of toxic contaminants into the air or water, people may come into contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

Air pollutants for which no ambient air quality standards have been established are called noncriteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, noncriteria pollutants have no ambient (outdoor) air quality standards that specify levels considered safe for everyone.

Since noncriteria pollutants do not have such standards, a health risk assessment is used to determine if people might be exposed to those types of pollutants at unhealthy levels. The risk assessment consists of the following steps:

- identify the types and amounts of hazardous substances that ISEGS could emit to the environment;
- estimate worst-case concentrations of project emissions in the environment using dispersion modeling;
- estimate amounts of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact; and
- characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

For this analysis, BLM relied upon the expertise of the California Environmental Protection Agency (Cal/EPA) OEHHA to identify contaminants that are known to the state to cause cancer or other noncancer toxicological endpoints and to calculate the toxicity and cancer potency factors of these contaminants. BLM also relied upon the expertise of the California Air Resources Board and the local air districts to conduct ambient air monitoring of toxic air contaminants and the state Department of Public Health to conduct epidemiological investigations into the impacts of pollutants on communities.

Initially, a screening level risk assessment is performed using simplified assumptions that are intentionally biased toward protection of public health. That is, an analysis is designed that overestimates public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the power plant will be much lower than the risks as estimated by the screening level assessment. The risks for screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those conditions in the study. Such conditions include:

- using the highest levels of pollutants that could be emitted from the plant;

- assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- using the type of air quality computer model which predicts the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be the highest;
- assuming that an individual's exposure to cancer-causing agents occurs continuously for 70 years; and
- using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening level risk assessment will, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances that could present a health hazard from noninhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these substances are present in facility emissions, the screening level analysis includes the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (OEHHA 2003, p. 5-3).

The risk assessment process addresses three categories of health impacts: acute (short-term) health effects, chronic (long-term) noncancer effects, and cancer risk (also long-term). Acute health effects result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Acute effects are temporary in nature and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic health effects are those that arise as a result of long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from 12 percent to 100 percent of a lifetime, or from 8 to 70 years (OEHHA 2003, p. 6-5). Chronic health effects include diseases such as reduced lung function and heart disease.

The analysis for noncancer health effects compares the maximum project contaminant levels to safe levels called *Reference Exposure Levels*, or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The Reference Exposure Levels are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include margins of safety. The margin of safety addresses uncertainties associated with inconclusive scientific and technical information available at the time of standard setting and is meant to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection is achieved if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

Exposure to multiple toxic substances may result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with the California Air Pollution Control Officers Association (CAPCOA) guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures include those cases where the actions may be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of substances, the health risk assessment could underestimate or overestimate the risks.

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the cancer-causing substance occurs over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound number based on worst-case assumptions.

Cancer risk is expressed in chances per million and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called *potency factors* and established by OEHHA), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used means that actual cancer risks due to project emissions are likely to be considerably lower than those estimated.

The screening analysis is performed to assess worst-case risks to public health associated with the proposed project. If the screening analysis predicts no direct, adverse risks, then no further analysis is required. However, if potentially adverse risks are identified, then further analysis, using more realistic site-specific assumptions, would be performed to obtain a more accurate assessment of potential public health risks.

Significance Criteria

For this project, BLM determines the health effects of exposure to toxic emissions based on impacts to the maximum exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using worst-case assumptions, as described above.

As described earlier, noncriteria pollutants are evaluated for short-term (acute) and long-term (chronic) noncancer health effects, as well as cancer (long-term) health effects. The significance of project health impacts is determined separately for each of the three categories.

Acute and Chronic Noncancer Health Effects

BLM assesses the significance of noncancer health effects by calculating a *hazard index*. A hazard index is a ratio comparing exposure from facility emissions to the reference (safe) exposure level. A ratio of less than 1.0 signifies that the worst-case exposure is below the safe level. The hazard index for every toxic substance that has the same type of health effect is added to yield a Total Hazard Index. The Total Hazard Index is calculated separately for acute and chronic effects. A Total Hazard Index of less than 1.0 indicates that cumulative worst-case exposures are less than the reference exposure levels. Under these conditions, health protection from the project is likely to be achieved, even for sensitive members of the population. In such a case, BLM presumes that there would be no direct, adverse noncancer project-related public health impacts. This assumption is consistent with both California and EPA risk management guidelines.

Cancer Risk

BLM relied upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, (Health & Safety Code, §§25249.5 et seq.) for guidance to determine a cancer risk significance level. Title 22, California Code of Regulations section 12703(b) states that “the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure.” This level of risk is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. An important distinction is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas significance in this analysis would be based on the total risk from all cancer-causing chemicals. Thus, the manner in which the significance level is applied is more conservative (health-protective) than that applied by Proposition 65. The significant risk level of 10 in 1 million is consistent with the level of significance adopted by many air districts. In general, these air districts would not approve a project with a cancer risk exceeding 10 in 1 million. The MDAQMD also uses 10 in 1 million as the level of “Significant Health Risk” (MDAQMD 2006). The EPA has a similar level for acceptable risk.

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. BLM’s analysis also addresses potential impacts on all members of the population including the young, the elderly, people with existing medical conditions that may make them more sensitive to the adverse effects of toxic air contaminants, and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, BLM uses the most current acceptable public health exposure levels (both acute and chronic) set to protect the public from the effects of airborne toxics. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. Based on refined assumptions, if risk posed by the facility exceeds the significance level of 10 in 1 million, appropriate measures would be developed to avoid or minimize the risk. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than 10 in 1 million, this risk would be considered a direct, adverse impact.

4.8.2.1 Proposed Project

Construction Impacts

Potential risks to public health during construction may be associated with exposure to toxic substances in contaminated soil disturbed during site preparation, as well as diesel exhaust from heavy equipment operation. Criteria pollutant impacts from the operation of heavy equipment and particulate matter from earth moving are examined in Section 4.1.

Site disturbances occur during facility construction from excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off site through soil erosion, and uncovering buried hazardous substances. A Phase I Environmental Site Assessment conducted for this site in 2007 identified no "Recognized Environmental Conditions" per the American Society for Testing and Materials Standards (ASTM) definition. That is, there was no evidence or record of any use, spillage, or disposal of hazardous substances on the site, nor was there any other environmental concern that would require remedial action. In fact, the report concluded that the project site has never been used for commercial or industrial activities (CH2M Hill 2007, Appendix 5.14A). In the event that any unexpected contamination is encountered during construction, mitigation measures in Section 4.14 (**Waste-1** and **Waste-2,** which require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil) would ensure that contaminated soil does not affect the public. See Section 4.14 for a more detailed analysis of this topic.

The operation of construction equipment will result in air emissions from diesel-fueled engines. Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Although diesel exhaust contains criteria pollutants such as nitrogen oxides, carbon monoxide, and sulfur oxides, it also includes a complex mixture of thousands of gases and fine particles. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust contains over 40 substances that are listed by the EPA as hazardous air pollutants and by the California ARB as toxic air contaminants.

Exposure to diesel exhaust may cause both short- and long-term adverse health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Long-term effects can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies also strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer.

Based on a number of health effects studies, the Scientific Review Panel on Toxic Air Contaminants recommended a chronic reference exposure level (see discussion of reference exposure levels in Method of Analysis section above) for diesel exhaust particulate matter of 5 micrograms of diesel particulate matter per cubic meter of air ($\mu g/m^3$) and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ (SRP 1998, p. 6). The Scientific

Review Panel did not recommend a value for an acute Reference Exposure Level since available data in support of a value was deemed insufficient. On August 27, 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved the panel's recommendations regarding health effect levels.

Construction of the three power plants of ISEGS is anticipated to take place over a period of 48 months, with each phase taking about 24 months to complete and with 12 months of overlap between the construction of any of the two power plants at one time (CH2M Hill 2007 section 2.2.15). As noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from 8 to 70 years.

Appendix 5.1F of the AFC (CH2M Hill 2007) presents diesel exhaust emission factors and daily emissions from construction equipment. The applicant estimated worst-case emissions of 267.38 pounds per day of PM10 and 57.56 pounds per day of PM2.5 during construction. Modeling of construction activities including impacts of fugitive dust over a 12-month period (using ISCST3; Industrial Source Complex Short-term, version 3) resulted in a predicted annual average concentration of 0.7 $\mu g/m^3$ of PM10 and 0.2 $\mu g/m^3$ of PM2.5 at any location. Annual background concentrations of PM10 and PM2.5 measured in the vicinity of the ISEGS site are 25.4 $\mu g/m^3$ and 10.6 $\mu g/m^3$ respectively (CH2M Hill 2007 Table 5.1F-4). The maximum carcinogenic risk from exposure to diesel emissions during 32 months of construction (not including 15 months of vegetation removal and using average annual emissions estimated for the peak period of construction) was modeled using the ARB/OEHHA Hotspots Analysis and Reporting Program (HARP). The expected cancer risk calculated with the assumptions detailed in section F-5.4 of the AFC would be between 0.3 and 0.5 in 1 million in the immediate vicinity of the project site (CH2M Hill 2007 Appendix 5.1F). The applicant has stated that the estimated cancer risk is over-predicted due to the conservative nature of the model used.

The estimated maximum 24-hour emissions of PM10 exceed the federal PSD level of significance. However, the applicant stated that background concentrations already exceed the PSD significance level and that these levels were established for emissions associated with a facility's routine operations and therefore are not appropriate for determining the significance of emissions over a short period of construction.

Mitigation measures include the use of extensive fugitive dust control measures in mitigation measures **AQ-SC3** and **AQ-SC-7**. The fugitive dust control measures are assumed to result in 90 percent reductions of emissions. The applicant has stated that the ISEGS project would incorporate all feasible mitigation measures to reduce PM10 (CH2M Hill 2007 section F-4.5.3 of Appendix 5.1F).

In accordance with Air Quality Condition of Certification **AQ-SC5** (required by the Energy Commission in their FSA), and in order to further mitigate potential impacts from particulate emissions during the operation of diesel-powered construction equipment, ultra-low sulfur diesel fuel and Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines would be used. In the event that a Tier 3 engine is not available for any off-road equipment larger than 100 hp, that equipment is to be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of NOx and DPM to no more than Tier 2 emission standard levels. The retrofit controls include installation of an oxidation catalyst and soot filters on diesel equipment. The catalyzed diesel particulate filters are passive, self-regenerating filters that reduce particulate matter, carbon monoxide, and hydrocarbon emissions through catalytic oxidation and filtration. The degree of particulate matter reduction is comparable for both mitigation measures in the range of approximately 85–92 percent. Such Tier 3 or 2 engines or use of diesel particulate filters on engines that do not meet Tier 3 or 2 emission standards, will reduce diesel emissions during construction and reduce any potential for adverse health impacts.

Operation Impacts

Emissions Levels

The emissions associated with operation of the proposed project are quantified by conducting a “worst case” analysis. Maximum hourly emissions are required to calculate acute (one-hour) noncancer health effects, while estimates of maximum emissions on an annual basis are required to calculate cancer and chronic (long-term) noncancer health effects.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The applicant’s screening analysis was performed using the ARB/OEHHA HARP. Ambient concentrations were used in conjunction with Reference Exposure Levels and cancer unit risk factors to estimate health effects that might occur from exposure to facility emissions. Exposure pathways, or ways in which people might come into contact with toxic substances, include inhalation, dermal (through the skin) absorption, soil ingestion, consumption of locally grown plant foods, and mother’s milk.

The above method of assessing health effects is consistent with OEHHA’s Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA, 2003) referred to earlier and results in the following health risk estimates.

Impacts

The applicant’s screening health risk assessment for the project including emissions from all sources resulted in a maximum acute Hazard Index (HI) of 0.013 and a maximum chronic HI of 0.00001 (CH2M Hill 2007 Table 5.9-4). As **Table 4.8-3** shows, both acute and chronic hazard indices are less than 1.0, indicating that no short- or long-term adverse health effects are expected.

Table 4.8-3
Operation Hazard/Risk at Point of Maximum Impact: Applicant Assessment

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Acute Noncancer	0.013	1.0	No
Chronic Noncancer	0.00001	1.0	No
Individual Cancer	0.065 in a million	10.0 in a million	No

Source: CH2M Hill 2007 Table 5.1E-1
0.065×10^{-6} = 0.065 in 1 million

As shown in **Table 4.8-3**, total worst-case individual cancer risk was calculated by the applicant to be 0.065 in 1 million at the location of maximum impact.

BLM conducted an independent analysis of cancer risks and acute and chronic hazards due to emissions from the three solar concentrating thermal power plants which make up the Ivanpah solar project (Ivanpah 1, 2, and 3). Each of the three thermal power plants includes three emitting units: a natural gas-fired boiler, a diesel fuel-fired emergency engine, and a diesel fuel-fired emergency firewater pump engine, for a total of nine emitting sources at the proposed facility.

BLM's quantitative analysis of facility operations included the following:

- emissions from the concurrent operation of all three natural gas boilers, the three emergency diesel generators, and from the three diesel fire pump engines.
- use of a coarse receptor grid of -6000 to 6000 meters east and -6000 to 6000 m north, at 500 meter increments.
- exposure pathways including inhalation, dermal absorption, soil ingestion, and mother's milk.

Atmospheric dispersion modeling was conducted using the ARB/OEHHA HARP, Version 1.3. BLM was unable to incorporate the local meteorological data provided by the applicant and used the ARB-approved screening meteorology file that is included with the HARP model. This file includes a full range of meteorological conditions, including all stability classes and wind speeds, and provides a conservative analysis of potential impacts. Local topography and receptor and source elevations were included in this analysis by incorporating demographic files of the local area in the modeling. Site-specific and building-specific input parameters used in the HARP model were obtained from the AFC and modeling files provided by the applicant.

The emission factors used in BLM's analysis of cancer risk and hazard were obtained from the AFC and are listed in **Table 4.8-4**. Cancer risk was determined under the Derived (OEHHA) and Derived (Adjusted) risk assessment methods. The following receptor locations were quantitatively evaluated in BLM's analysis:

- point of maximum impact (PMI), approximately 500 meters (1,640 feet) south of the southern boundary of Ivanpah 1 (70-year residential scenario)
- location of the nearest residence specified in the AFC, approximately 5.6 miles (9.1 km) northeast of the center of the project (70-year residential scenario)
- location of the nearest residence identified during a site visit by BLM (at a mobile home located to the southeast of the intersection of Interstate 15 and Yates Well Road), approximately 3.1 miles (5.0 km) southeast of the center of the project (70-year residential scenario)
- clubhouse at Primm Valley Golf Club, approximately 2.5 miles (4.0 km) east of the center of the project (recreational scenario assuming exposure of 5 hours/day, 2 days/week, 52 weeks/year for 70 years)
- clubhouse at Primm Valley Golf Club (occupational scenario assuming exposure of 8 hours/day, 50 weeks/year for 35 years)

Results of BLM's analysis are summarized in **Table 4.8-5** and are compared to the results presented in the AFC. Substance-specific risks are presented in **Table 4.8-6** for the point of maximum impact and in **Table 4.8-7** for the nearest residence.

Table 4.8-4
Emission Factors Used in the Cancer Risk and Hazard Analyses

	Annual Average Emissions lbs/year			Maximum 1-Hour Emissions lbs/hour		
Substance	**Boiler**	**Emergency Generator**	**Emergency Fire Pump**	**Boiler**	**Emergency Generator**	**Emergency Fire Pump**
Ivanpah 1 & 2						
Hexane	4.73E+01			4.05E-01		
PAHs	2.63E-03			2.25E-05		
Toluene	8.96E-02			7.64E-04	9.67E-04	6.17E-05
Naphthalene	1.60E-02			1.37E-04		
Benzene	5.52E-02			4.72E-04	2.20E-03	1.40E-04
Formaldehyde	1.97E+00			1.69E-02	2.78E-03	1.78E-04
Xylene					6.72E-04	4.30E-05
Diesel PM		1.49E+01	2.38E+00			
Acrolein					2.18E-04	1.40E-05
1,3-Butadiene					9.20E-05	5.90E-06
Ivanpah 3						
Hexane	1.89E+02			8.10E-01		
PAHs	1.05E-02			4.50E-05		
Toluene	3.57E-01			1.53E-03	9.67E-04	6.17E-05
Naphthalene	6.41E-02			2.74E-04		
Benzene	2.21E-01			9.44E-04	2.20E-03	1.40E-04
Formaldehyde	7.85E+00			3.37E-02	2.78E-03	1.78E-04
Xylene					6.72E-04	4.30E-05
Diesel PM		1.49E+01	2.38E+00			
Acrolein					2.18E-04	1.40E-05
1,3-Butadiene					9.20E-05	5.90E-06

Source: CH2M Hill 2007, Table 5.1-B6

Table 4.8-5
Results of Analysis for Cancer Risk and Chronic Hazard

Risk Methodology	Agency's Analysis			Applicant's Analysis		
	Cancer Risk (per million)	Chronic HI	Acute HI	Cancer Risk (per million)	Chronic HI	Acute HI
PMI Derived(OEHHA)	2.9	0.0014	0.057	0.084	0.00001	0.013
Nearest residence[2] Derived(OEHHA)	0.16	0.000084	0.0025	-	-	-
Second nearest residence[3] Derived(OEHHA)	0.12	0.000066	0.0032	-	-	-
Clubhouse, recreational, Derived(OEHHA)	0.0089	-	-	-	-	-
Clubhouse, occupational	0.017	-	-	-	-	-

HI = Hazard Index

[2] Location of the nearest residence identified during a site visit by BLM (at a trailer located to the southeast of the intersection of Interstate 15 and Yates Well Road), 70-year residential scenario.

[3] Location of the nearest residence specified in the AFC, 70-year residential scenario.

Table 4.8-6
Results of Agency Analysis: Contribution to Total Cancer Risk by Individual Substances at the Point of Maximum Impact (PMI)

Ivanpah 1

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	5.2E-09		
Naphthalene	3.6E-11		
Benzene	1.0E-10		
Formaldehyde	7.8E-10		
DieselExhPM		2.4E-06	3.1E-07
TOTAL	6.1E-09	2.4E-06	3.1E-07

Ivanpah 2

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	7.7E-10		
Naphthalene	5.3E-12		
Benzene	1.5E-11		
Formaldehyde	1.1E-10		
DieselExhPM		1.1E-07	1.7E-08
TOTAL	9.0E-10	1.1E-07	1.7E-08

Ivanpah 3

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	1.4E-09		
Naphthalene	9.6E-12		
Benzene	2.7E-11		
Formaldehyde	2.1E-10		
DieselExhPM		3.4E-08	5.4E-09
TOTAL	1.6E-09	3.4E-08	5.4E-09

Ivanpah 1, 2 & 3

Substance	TOTAL DUE TO 3 SOURCES AT 3 UNITS
PAHs-w/o	7.3E-09
Naphthalene	5.1E-11
Benzene	1.5E-10
Formaldehyde	1.1E-09
DieselExhPM	2.9E-06
TOTAL	2.9E-06

Table 4.8-7
Results of Agency Analysis: Contribution to Total Cancer Risk by Individual Substances at Nearest Residence

Ivanpah 1

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	6.1E-10		
Naphthalene	4.2E-12		
Benzene	1.2E-11		
Formaldehyde	9.1E-11		
DieselExhPM		9.0E-08	1.4E-08
TOTAL	7.2E-10	9.0E-08	1.4E-08

Ivanpah 2

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	2.7E-10		
Naphthalene	1.8E-12		
Benzene	5.3E-12		
Formaldehyde	4.0E-11		
DieselExhPM		2.9E-08	4.3E-09
TOTAL	3.1E-10	2.9E-08	4.3E-09

Ivanpah 3

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	7.7E-10		
Naphthalene	5.4E-12		
Benzene	1.5E-11		
Formaldehyde	1.2E-10		
DieselExhPM		1.4E-08	2.1E-09
TOTAL	9.1E-10	1.4E-08	2.1E-09

Ivanpah 1, 2 & 3

Substance	TOTAL DUE TO 3 SOURCES AT 3 UNITS
PAHs-w/o	1.7E-09
Naphthalene	1.1E-11
Benzene	3.3E-11
Formaldehyde	2.5E-10
DieselExhPM	1.5E-07
TOTAL	1.6E-07

Closure and Decommissioning Impacts

Closure of the proposed ISEGS would presumably begin 50 years from the start of commercial operation and would follow a Closure, Revegetation, and Rehabilitation Plan prepared by the applicant and designed to minimize public health and environmental impacts (CH2M Hill 2010). The preparation and implementation of the Closure, Revegetation, and Rehabilitation Plan would be in accordance with mitigation measures **BIO-14 and BIO-27**. BLM expects that impacts to public health from the closure and decommissioning process would represent a fraction of the impacts associated with the construction or operation of the proposed ISEGS. Therefore based on the analysis for the construction and operation phases of this project, no adverse public health-related impacts from closure and decommissioning of the ISEGS would occur.

Beneficial Impacts

It is noteworthy that a solar electric generating facility such as the proposed ISEGS project would emit significantly less TACs to the environment than other energy sources available in California such as natural gas or biomass, thereby reducing the health risks that would otherwise occur with these non-renewable energy sources. At the same time, the proposed ISEGS would provide much needed electrical power to California residences and businesses, and will contribute to electric reliability. Electrical power is not only necessary to maintain a functioning society, but it also benefits many individuals who rely on powered equipment for their health (such as dialysis equipment and temperature control equipment). For example, it is documented that during heat waves in which elevated air-conditioning use causes an electrical blackout, hospitalizations and deaths due to heat stroke are increased.

4.8.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

The public health and safety impacts that could result from construction of the Mitigated Ivanpah 3 Alternative would include public exposure to toxic substances in contaminated soil disturbed during construction, and exposure to diesel exhaust from heavy equipment operation.

For the proposed project, there was no evidence or reason to suspect the presence of potentially contaminated soil on the property, and waste management regulations and mitigation measures would result in the identification and assessment of any hazardous materials during construction. Because the Mitigated Ivanpah 3 Alternative would disturb an area with a reduced acreage, the potential for exposing the public to contaminated soils would be lower than that for the proposed project.

Section 4.8.2.1 presented an evaluation of potential public health threats associated with exposure to construction emissions from the proposed project. That analysis concluded that mitigation measures intended to reduce diesel emissions from equipment and vehicles, and management practices intended to minimize fugitive dust emissions, would reduce any potential for adverse health impacts. Because the Mitigated Ivanpah 3 Alternative would use the same types of heavy equipment and would have the same air emissions as the proposed project, the health impacts from construction would be the same as those described for the proposed project. In addition, the duration of construction would be expected to be shorter for the Mitigated Ivanpah 3 Alternative, by approximately 17 percent. Therefore, the public health and safety impacts associated with construction of the Mitigated Ivanpah 3 Alternative would be expected to be lower than those for the proposed project.

Operations Impacts

Public health and safety impacts resulting from the operation of the Mitigated Ivanpah 3 Alternative would potentially occur from public exposure to air emissions from the natural-gas fired steam boilers, emergency diesel fire pumps, and emergency diesel generators. For the proposed project, the results of a screening health risk assessment indicated that the Hazard Index associated with operations emissions was far below any value that could cause public health and safety threats. For example, the acute non-cancer Hazard Index was calculated to be 0.013, as compared to the significance level of 1.0. Therefore, no short-term or long-term adverse health effects from the proposed project would be expected.

The reduction in size of the boiler associated with Unit 3 in the Mitigated Ivanpah 3 Alternative would result in a reduction in overall operations emissions associated with the alternative. However, the relocation of the Unit 3 power block closer to the project boundary would result in increased concentrations of NOx emissions at the site boundary for very short durations (1 hour and 3 hours). Although the short-term NOx emissions at the site boundary would increase, the increase is very slight, from 123.7 to 126.7 micrograms per liter. Because the Hazard Index calculated for the proposed project was substantially below the significance level, this slight increase in short-term NOx concentrations would not result in adverse public health impacts from the Mitigated Ivanpah 3 Alternative.

Closure and Decommissioning Impacts

Potential public health and safety threats associated with the closure and decommissioning of the Mitigated Ivanpah 3 Alternative would include public exposure to emissions from heavy equipment used to remove project-related structures, including removal of 173,500 heliostats. The closure and decommissioning of the Mitigated Ivanpah 3 Alternative would include the same type of equipment and activities as project construction, but for a much shorter duration. Therefore, public health and safety impacts associated with closure and decommissioning of the Mitigated Ivanpah 3 Alternative would be lower than those associated with the proposed project, and therefore would not be expected to be adverse.

Beneficial Impacts

Similar to the proposed project, the Mitigated Ivanpah 3 Alternative would emit significantly less TACs to the environment than other energy sources available in California such as natural gas or biomass, thereby reducing the health risks that would otherwise occur with these non-renewable energy sources.

4.8.2.3 Modified I-15 Alternative

Construction Impacts

The public health and safety impacts that could result from construction of the Modified I-15 Alternative would include public exposure to toxic substances in contaminated soil disturbed during construction, and exposure to diesel exhaust from heavy equipment operation.

For the proposed project, there was no evidence or reason to suspect the presence of potentially contaminated soil on the property, and waste management regulations and mitigation measures would result in the identification and assessment of any hazardous materials during construction. Although an assessment of the revised Ivanpah Unit 3 location has not been conducted, the area appears, based on cursory visual inspection, to be undeveloped. Therefore, for the purpose of the analysis in this section, it is assumed that the condition of the reconfigured location of Ivanpah Unit 3 is the same as the condition of the Ivanpah Unit 3 area in the proposed project.

Section 4.8.2.1 presented an evaluation of potential public health threats associated with exposure to construction emissions from the proposed project. That analysis concluded that mitigation measures intended to reduce diesel emissions from equipment and vehicles, and management practices intended to minimize fugitive dust emissions, would reduce any potential for adverse health impacts. Because the Modified I-15 Alternative would use the same types of heavy equipment and would have the same air emissions as the proposed project, the health impacts from construction would be the same as those described for the proposed project. In addition, the duration of construction would be expected to be shorter for the Modified I-15 Alternative, by approximately 17 percent. Therefore, the public health and safety impacts associated with construction of the Modified I-15 Alternative would be expected to be lower than those for the proposed project.

Operations Impacts

Public health and safety impacts resulting from the operation of the Modified I-15 Alternative would potentially occur from public exposure to air emissions from the natural-gas fired steam boilers, emergency diesel fire pumps, and emergency diesel generators. For the proposed project, the results of a screening health risk assessment indicated that the Hazard Index associated with operations emissions was far below any value that could cause public health and safety threats. For example, the acute noncancer Hazard Index was calculated to be 0.013, as compared to the significance level of 1.0. Therefore, no short-term or long-term adverse health effects from the proposed project would be expected.

The reduction in size of the boiler associated with Unit 3 in the Modified I-15 Alternative would result in a reduction in overall operations emissions associated with alternative. However, the relocation of the Unit 3 power block closer to the project boundary would result in increased concentrations of NOx emissions at the site boundary for very short durations (1 hour and 3 hours). Although the short-term NOx emissions at the site boundary would increase, the increase is very slight, from 123.7 to 126.7 micrograms per liter. Because the Hazard Index calculated for the proposed project was substantially below the significance level, this slight increase in short-term NOx concentrations would not result in adverse public health impacts from the Modified I-15 Alternative.

Closure and Decommissioning Impacts

Potential public health and safety threats associated with the closure and decommissioning of the Modified I-15 Alternative would include public exposure to emissions from heavy equipment used to remove project-related structures, including removal of 173,500 heliostats. The closure and decommissioning of the Modified I-15 Alternative would include the same type of equipment and activities as project construction, but for a much shorter duration. Therefore, public health and safety impacts associated with closure and decommissioning of the Modified I-15 Alternative would be lower than those associated with the proposed project, and therefore would not be expected to be adverse.

Beneficial Impacts

Similar to the proposed project, the Modified I-15 Alternative would emit significantly less TACs to the environment than other energy sources available in California such as natural gas or biomass, thereby reducing the health risks that would otherwise occur with these non-renewable energy sources.

4.8.2.4 No Action Alternative

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The public health impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and could include consideration of another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

4.8.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

BLM has considered the minority population as identified in Section 4.9 in its impact analysis and has found no potential direct, adverse impacts for any receptors, including environmental justice populations. In arriving at this conclusion, BLM notes that its analysis complies with all directives and guidelines from the Cal/EPA Office of Environmental Health Hazard Assessment and the California Air Resources Board. BLM's assessment is biased toward the protection of public health and takes into account the most sensitive individuals in the population. Using extremely conservative (health-protective) exposure and toxicity assumptions, BLM's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project—including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions—will not experience any acute or chronic health risk or any cancer risk as a result of that exposure. This analysis has incorporated every conservative assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative public health and safety impacts to any population in the area. Therefore, given the absence of any direct health impacts, there are no disparate health impacts and there are no environmental justice issues associated with public health and safety.

Construction and operation of the ISEGS would be in compliance with all applicable laws and regulations regarding long-term and short-term project impacts in the area of public health and safety.

4.8.4 Mitigation Measures

No measures are proposed for public health and safety.

4.8.5 Summary

The analysis of potential public health risks associated with construction and operation of the ISEGS has not resulted in the identification of any adverse cancer, short-term, or long-term health effects to any members of the public, including low income and minority populations, from project toxic emissions. The analysis of potential health impacts from the proposed ISEGS uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of the health risk assessment, emissions from the ISEGS would not contribute directly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

Overall, by following regulatory requirements and proposed mitigation measures, there would be no potential impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any potential public health threats would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration and acreage of construction, reduced overall level of emissions, and reduced duration of decommissioning.

Table 4.8-8
Comparison of Public Health and Safety Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Exposure to contaminated soil	No potential impact.	No potential impact	No potential impact	No potential impact.
Exposure to emissions from construction and decommissioning equipment	No adverse impact, could be mitigated.	Lower than proposed project, higher than No Action	Lower than proposed project, higher than No Action	No potential impact.
Exposure to operations emissions	No adverse impact, could be mitigated.	Slightly higher than proposed project, higher than No Action	Slightly higher than proposed project, higher than No Action	No potential impact.

4.9 Socioeconomics and Environmental Justice

Introduction

BLM's socioeconomics impact analysis evaluates project-induced changes on existing population and employment patterns, community services, and related community issues such as environmental justice. A discussion of the estimated economic impacts of the construction and operation of the proposed ISEGS and other related economic impacts are provided. For purposes of analyzing the complete ISEGS project, this section analyzes the proposed ISEGS (Phases 1, 2, and 3) as a whole. Therefore, Socioeconomics and Environmental Justice setting data and analysis are presented for the entire ISEGS project.

Resource-Specific Project Description

It is anticipated that the construction period for the proposed ISEGS would occur from first quarter 2009 through fourth quarter 2012. There will be an average of approximately 474 daily construction workers, with a peak daily workforce of 959, depending on the month and the work required. Laborers would consist of craftspeople and supervisory, support, and construction management personnel on site during construction. According to AFC section 2.0 (Project Description), the peak construction labor force of 959 total daily construction workers would occur during the 32nd month of construction. This maximum employment number is used to analyze worst-case construction population and employment impacts.

According to AFC section 2.0, the proposed ISEGS is expected to employ a total of 90 permanent full-time employees (management, engineering, and administrative staff; skilled workers; and operators). According to AFC section 5.10 (Socioeconomics), it is anticipated that most of the operational workforce will be drawn from the City of Las Vegas within Clark County, Nevada, as well as parts of surrounding rural areas in San Bernardino County, California.

Applicable Laws, Regulations, and Supplemental Authorities

Table 4.9-1 contains all applicable laws, regulations, and supplemental authorities applicable to the proposed ISEGS.

Table 4.9-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Laws or Regulations	Description
Federal	
Executive Order 12898 (Federal Register, Vol. 59, No. 32, February 11, 1994)	Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on agencies to achieve environmental justice as part of this mission. The order requires the EPA and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.
National Environmental Policy Act 42 United States Code (USC) 4321 et seq.	Under NEPA, an environmental impact statement must discuss social and economic effects if they are related to the natural or physical effects and the definition of "effects" includes economic and social factors. Consequently, a federal environmental document must include an analysis of the proposed project's economic, social, and demographic effects related to effects on the natural or physical environment in the affected area, but does not allow for economic, social, and demographic effects to be analyzed in isolation from the physical environment.
State	
California Education Code, section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, sections 65996–65997	These sections include provisions for school district levies against development projects. As amended by Senate Bill 50 (Greene, Chapter 407, section 23, Statutes of 1998), these sections state that, except for fees established under Education Code 17620, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost of school facilities.
California Revenue and Taxation Code, sections 721–725: California Board of Equalization (BOE) – Property Tax Rule 905 (BOE authority to assess electrical generating facilities is found in Article XIII, section 19, of California's Constitution)	Property Tax Rule 905 states "the Board shall annually assess every electric generation facility with generating capacity of 50 MW or more..." It also states that for purposes of this rule, "electric generation facility" does not include a qualifying small power production facility or qualifying cogeneration facility within the meaning of section 201 and section 210 of Title II of the Public Utility Regulatory Policies Act of 1978. According to this act, (16 USC, section 796 [17] [A]), a "small power production facility is defined as 'A facility which is eligible solar, wind, waste, or geothermal facility...[that] has a power production capacity, which together with any other facilities located at the same site, is not greater than 80 MW.'"

Applicable Laws or Regulations	Description
Local	
San Bernardino County General Plan	San Bernardino County General Plan's (2007) Economic Development Element calls for a vibrant and thriving local economy that spans a variety of industries, services, and other sectors while recognizing the distinctions between the growth stages of the Valley, Mountain, and Desert Planning Regions in encouraging industrial, office, and professional development and local-serving employment. The Economic Development Background report (2005) states that the Desert Planning Region (which includes the proposed ISEGS site) is just entering Stage 2 of the three-stage pattern of development. Stage 2 is where an area is capable of attracting blue collar and entry-level white collar workers and companies that take advantage of undeveloped industrial space. The San Bernardino County General Plan is not applicable to projects located on Federal lands.

4.9.1 Affected Environment

Project Location

Research shows that workers may commute as much as two hours each direction from their communities rather than relocate (EPRI 1982). Therefore, for purposes of this analysis, the socioeconomics study area is San Bernardino County in California and Clark County in Nevada. San Bernardino County is bordered on the north by Inyo County, on the south by Riverside County, on the west by Los Angeles, Kern, and Orange Counties; on the east by Clark County, Nevada, and also by portions of Mojave and La Paz Counties in Arizona. There are 24 incorporated cities in San Bernardino County, including Fontana, Ontario, Rancho Cucamonga, and San Bernardino. There are five incorporated cities in Clark County, Nevada, including Las Vegas.

Demographic Characteristics

Within the study area, San Bernardino County, California, and Clark County, Nevada, are considered areas that may be affected by potential population in-migration resulting from the proposed ISEGS. In order to characterize the population profile of the study area, current and forecasted population trends for the study area are summarized in **Table 4.9-2**. Between the period of 2000 and 2010, the total population increase in San Bernardino County, California, is expected to be approximately 25 percent, while the population increase in Clark County, Nevada, within the same time period is expected to be approximately 64 percent.

Table 4.9-2
Population Profile of the Study Area, Year 2000–2030

Area	**Year**			
	2000 Population	**2010 Projected Population**	**2020 Projected Population**	**2030 Projected Population**
San Bernardino County, CA	1,709,434	2,133,377	2,456,089	2,762,307
Clark County, NV	1,375,765	2,258,748	2,946,350	3,358,456

Source: US Census 2008; CDOF 2008a; Clark County 2008a.

Demographic Screening

BLM's demographic screening is designed to determine the existence of a minority or below-poverty-level population or both within a six-mile area of the proposed project site.

The demographic screening process is conducted based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, 1997) and *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* (Council on Environmental Quality, 1998). Based on the demographic screening analysis, the potential affected area is a six-mile radius of the proposed ISEGS site. The six-mile radius is consistent with the radius used in Section 5.1 of the DEIS to determine potential air quality impacts. The screening process relies on Year 2000 U.S. Census data to determine levels of minority and below-poverty-level populations.

Minority Population

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

A minority population, for the purposes of environmental justice, is identified when the minority population of the potentially affected area is (1) greater than 50 percent; (2) meaningfully greater than the percentage of the minority population in the general population or other appropriate unit of geographical analysis; or (3) when one or more U.S. Census blocks in the potentially affected area have a minority population of greater than 50 percent.

For the proposed ISEGS project, the total population within the six-mile radius of the proposed site is 36 persons, and the total minority population is 10 persons or 27.8 percent of the total population (see **Figure 4.9-1**).[25] Primm, Nevada is entirely contained within the six-mile radius of the proposed ISEGS site but is not included in **Figure 4.9-1** as Primm was not considered a Census Designated Place at the time of the Year 2000 Census (US Census, 2008). Therefore, no Year 2000 Census Data is available for the City of Primm. In 2008, the community of Primm had a population of 1,060 persons (Clark County 2008b). As shown in **Figure 4.9-1**, no census blocks within a six-mile radius of the proposed ISEGS site contain minority populations greater than 50 percent.

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[25] To more accurately map the affected population, **Figure 4.9-1** typically includes only US census blocks that contain over 50 percent of the blocks' geographic area within a six-mile radius of a proposed site. In the ISEGS case, the census blocks were extremely large and captured population that extended 60 miles to the southwest and 50 miles to the northwest of the ISEGS site to include population in Boulder City and south Las Vegas, NV. Primm, NV is in the census block that extends 50 miles to the northwest of the

Below-Poverty-Level Population

BLM has also identified the below-poverty-level population based on Year 2000 U.S. Census block data within a six-mile radius of the project site. The below-poverty-level population within a six-mile radius of the proposed ISEGS project consists of no people or 0.0 percent of the total population in that area.

Environmental Justice

Executive Order 12898, "Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on federal agencies to achieve environmental justice as part of this mission. The order requires the EPA and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

The purpose of the screening analysis is to determine whether a minority or low-income population exists within the potentially affected area of the proposed site. The environmental justice screening analysis in conducted in accordance with the "Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis" dated April 1998, which defined minority populations as either:

- the minority population of the affected area is greater than 50% of the affected area's general population; or
- the minority population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

California Statute, Section 65040.12 (c) of the Government Code, defines "environmental justice" to mean "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."

The steps recommended by these guidance documents to assure compliance with the Executive Order are: (1) outreach and involvement; (2) a screening-level analysis to

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project site and data was not used because it would grossly miscount the population in that area. Therefore, the census data, including the population and race for the town of Primm was not represented on the map.

determine the existence of a minority or low-income population; and (3) if warranted, a detailed examination of the distribution of impacts on segments of the population.

According to the Census 2000 data there were 36 people within six miles of the proposed project site which resided within California. With 10 or 27.8 percent of the total California residents classified as minority. (see **Figure 4.9-1**), no census blocks within a six-mile radius of the proposed ISEGS site contain minority populations greater than 50 percent. The 2000 Census block data did not identify any California residents living below the designated poverty level within a six-mile radius of the project site.

No minority communities or low income communities are located within or adjacent to the proposed project areas. The proposed action would not impact distinct Native American cultural practices or result in disproportionately high or adverse human health or environmental effects on minority communities.

Employment Characteristics

Labor force characteristics for the study area, which includes San Bernardino County, California (Year 2006 data), and Clark County, Nevada (Year 2005 data), are described in **Table 4.9-3**. San Bernardino County is part of the Riverside-San Bernardino-Ontario Metropolitan Statistical Area (MSA) as defined by the U.S. Census Bureau. In 2006, total employment in the Riverside-San Bernardino-Ontario MSA was 1,084,800. As shown in **Table 4.9-3**, construction, manufacturing, retail trade, and services were the largest employment sectors. Clark County is part of the Las Vegas-Paradise MSA. In 2005, total employment in the Las Vegas-Paradise MSA was 871,600, with the largest employment sectors being construction and services.

Table 4.9-3
Labor Force Characteristics, San Bernardino County, California (Year 2006) and Clark County, Nevada (Year 2005)

Industry	Riverside-San Bernardino-Ontario MSA 2006 Labor Force Characteristics	Las Vegas-Paradise MSA 2005 Labor Force Characteristics
Agriculture	17,200	N/A
Natural Resources, Mining	1,400	400
Construction	129,500	101,500
Manufacturing	124,000	25,000
Wholesale Trade	53,800	22,200
Retail Trade	171,500	94,000
Transportation, Warehousing, and Utilities	63,800	32,400
Information	15,200	10,400
Financial Activities	51,800	48,800
Services	436,200	449,400
Government	18,800	87,500
Total Employed	1,084,800	871,600
Unemployment	41,800 (4.7%)	33,000 (3.7%)

Source: CEDD 2008a; CEDD 2008b; NDETR 2008a.

Housing

Current housing conditions within the study area are shown in **Table 4.9-4.** There were 1,402,485 total housing units in the study area in 2006, with 110,011 of these units vacant, creating a study area vacancy rate of 7.8 percent.

Table 4.9-4
Housing Units in the Study Area, Year 2006

	Total Units	Single-Family	Multi-Family	Mobile Homes	Percent Vacant
Clark County, NV	740,817	433,317	227,040	30,460	32,596 (4.4%)
San Bernardino County, CA	661,668	492,519	125,594	43,555	77,415 (11.7%)
Total	1,402,485	925,836	352,634	74,015	110,011 (7.8%)

Source: CDOF 2008b; Clark County 2008a.

Fiscal Revenue

The two key taxing agencies in the study area are San Bernardino County, California, and Clark County, Nevada. As comparable fiscal data for Clark County, Nevada, is unavailable, fiscal data for the City of Las Vegas (the primary Metropolitan Service Area within Clark County, Nevada) is presented. **Table 4.9-5** shows the revenues and expenditures for both San Bernardino County and the City of Las Vegas for fiscal year 2006. As shown, both San Bernardino County and the City of Las Vegas generated more revenue than expenditures in fiscal year 2006.

Table 4.9-5
Fiscal Revenue and Expenditures for San Bernardino County, California, and the City of Las Vegas, Nevada, Year 2006

	San Bernardino County*	City of Las Vegas*
Expenditures For Countywide Operations		
Admin/Exec	$462,158	$164,150
Contingencies	$59,124	N/A
Financial Administration	$6,916	$1,019
Debt Service	$21,137	$38,461
Economical Development Agency	$3,845	$22,205
Fiscal Group	$55,580	N/A
Human Services	$837,760	N/A
Law & Justice	$65,595	$26,169
Public and Support Services	$99,187	514,121
Total Expenses	$2,157,013	$917,834

	San Bernardino County*	City of Las Vegas*
Revenues		
Property Taxes	$415,936	$108,092
Sales and Other Taxes	$207,443	$7,954
Intergovernmental Revenue	$1,622,031	$442,187
Charges for Current Services	$568,348	$181,211
Other Revenue	$130,465	N/A
Operating Transfers In	$275,104	N/A
Fund Balance/Net Assets	$329,871	N/A
General Fund Unreserved Fund Balance	$100,699	N/A
Use of Reserves	$6,064	N/A
Contribution to Reserves	($35,453)	N/A
Total Other Financing	$676,285	N/A
Total Revenues and Financing Sources	$3,620,501	$1,442,055

Source: San Bernardino County 2008; City of Las Vegas 2008.
* $ Thousands
N/A – Data Not Available

Public Services

Physical impacts to public services and facilities are usually associated with population in-migration and growth in an area, which increase the demand for a particular service, leading to the need for expanded or new facilities. Therefore, public services data is provided below for both San Bernardino County and Clark County.

Police Protection

The proposed ISEGS site is located within the jurisdiction of the San Bernardino County Sheriff's Department, which is headquartered at 655 East 3rd Street in San Bernardino. The nearest sheriff's office to the proposed ISEGS site is the Barstow Station in the city of Barstow located at 225 East Mountain View Road (SBCo Sheriff 2008). The California Highway Patrol (CHP) is the primary law enforcement agency for California highways and roads (CHP 2008). CHP services include law enforcement, traffic control, accident investigation, and the management of hazardous materials incidents.

Within Clark County, the Las Vegas Metropolitan Police Department (LVMPD) provides police protection services. The LVMPD is a joint city/county police force providing law enforcement services for all of Clark County, including the City of Las Vegas, with over 2,600 sworn officers (LVMPD 2008).

Schools

The proposed ISEGS site is located within the Baker Valley Unified School District (BVUSD). Clark County School District (CCSD) provides school services to the Nevada portion of the study area. Current school enrollment figures within the study area for the 2006–2007 school year are shown in **Table 4.9-6.** As shown, the BVUSD has a small student enrollment, while the CCSD serves a large number of students.

Table 4.9-6
Enrollment Figures for the BVUSD and the CCSD, Year 2006–2007

Student Level	Baker Valley Unified School District	Clark County School District
Kindergarten	21	23,391
Elementary School (1st through 5th Grade)	82	121,816
Middle School (6th through 8th Grade)	42	73,862
High School (9th through 12th Grade)	56	84,681
Total	*201*	*303,750*

Source: ED-Data 2008; NDE 2008.

Hospitals

The closest hospital with an emergency room to the proposed ISEGS site is the Saint Rose Hospital - Siena Campus in Henderson, Nevada (within Clark County) located at 3001 St. Rose Parkway, approximately 40 miles east of the proposed ISEGS site. This facility is a 214-bed hospital and has over 2,600 employees with approximately 1,142 physicians in the area with staffing privileges at Saint Rose (SRDH 2008). The emergency room at Saint Rose Hospital is designated as a Level II trauma center that provides immediate, specialized care to accident victims and victims of sudden illness. Specialty services at the hospital include intensive care unit, emergency/trauma, labor and delivery, cardiac care, orthopedics, surgery, and transplant.

4.9.2 Environmental Consequences

BLM reviewed the socioeconomics section of the applicant's ISEGS AFC and the socioeconomic data provided and referenced from various governmental agencies and trade associations and conducted its own independent analysis to form the following socioeconomics analysis and conclusions.

Methodology

NEPA provides no specific thresholds of significance for socioeconomics impact assessment. Significance of impacts under NEPA depends on the setting of the proposed action. 40 CFR 1508.8 states that indirect effects may include those that are growth inducing and others related to induced changes in the pattern of land use, population density, or growth rate. BLM has used the list of thresholds below to evaluate socioeconomics impacts. A project may have a direct effect on socioeconomics if the project would:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere;
- Cause a substantial change in revenue for local businesses or government agencies; or
- Adversely impact acceptable levels of service for law enforcement, schools, and hospitals.

Typically, substantial long-term employment of people from regions outside the study area would have the potential to result in direct, adverse socioeconomic impacts due to a change in the local housing demand and supply and an increase in population resulting in increased demands to public services. In addition to direct population, employment, and housing impacts based on the above criteria, the following socioeconomic analysis looks at beneficial impacts on local finances from property and sales taxes as well as potential adverse impacts on public services. In order to determine if a project would have any direct impacts, BLM analyzes whether the current status of these community services and capacities can absorb the project-related impacts in each of these areas. A project's property taxes, sales tax, local school impact fees, or development fees can help local governments augment public services required to meet project needs. If the project's impacts could appreciably strain or degrade these services, this would constitue a direct, adverse impact.

The analysis of subject areas such as capacities of fire service providers, utilities, water use, and wastewater disposal are identified in Section 4.10, 4.14 and 4.15.

4.9.2.1 Proposed Project

Construction Impacts

Research shows that construction workers would commute as much as two hours each direction from their communities rather than relocate (EPRI 1982). BLM reviewed the socioeconomics data for counties within the two-hour commute range, which is within the study area and includes San Bernardino County and Clark County. **Table 4.9-3** indicates that a total of 231,000 construction workers are available within the study area. An assumed maximum need of 959 construction workers represents 0.4 percent of the total construction workforce within the study area. Because the number of construction workers required represents such a small portion of the local available labor force, it is assumed that no population in-migration would occur as a result of project-related construction activities. Therefore, no direct impacts would occur to existing population levels or employment distribution within the study area from the proposed ISEGS construction.

The proposed ISEGS site would be located within vacant BLM land and contains no housing. As such, no housing would be displaced. As presented in **Table 4.9-4,** there were 1,402,485 total housing units within the study area, with 110,011 vacant units, resulting in a 7.8 percent vacancy rate. As discussed above, during project construction all workers would reside within commuting distance of the proposed ISEGS site, and therefore would not need to move into the area. Therefore, no construction impacts are expected on the local housing supply availability or demand.

Since the required construction labor force would reside within the study area, no population increase would occur as a result of the proposed project, thereby eliminating the need for an increase in law enforcement services or facilities in the study area. In addition, according to AFC section 5.10, the San Bernardino County Sheriff's Department, which has primary responsibility for policing the proposed ISEGS site, did not express any concerns about the need for increased services as a result of the proposed ISEGS. Therefore, construction activities at the proposed ISEGS would not impact the existing service levels of the San Bernardino County Sheriff's Department or the Las Vegas Municipal Police Department. Information on potential impacts to the County's fire and hazardous materials emergency response services is presented in Section 4.15.

The Saint Rose Hospital - Siena Campus, serves the proposed ISEGS site. As all construction employees are expected to already reside within the study area, no additional constraints or physical impacts would occur to the healthcare services or facilities provided by the Saint Rose Hospital - Siena Campus. Therefore, construction of the proposed ISEGS would have no impacts to hospital facilities.

Operations Impacts

Research shows that operational workers would commute as much as one hour to a power plant site from their homes rather than relocate (EPRI 1982). This one-hour commute range is within the study area and includes San Bernardino County and Clark County.

As stated in **Table 4.9-3**, a total of 90 workers would account for a negligible amount of the total San Bernardino County and Clark County total labor force. As all workers would reside within the study area, no impacts to existing population levels would occur. Because the number of operational workers required represents such a small portion of the local available labor force, no adverse impacts to the study area population or employment base would result from proposed project operation.

The proposed ISEGS would generate property tax revenue to San Bernardino County, California. The California State BOE has jurisdiction over the valuation of a power-generating facility of 50 MW or more for property tax purposes except for a qualifying small power production facility or qualifying cogeneration facility such as a solar, wind, waste, or geothermal facility that together with any other facilities located at the same site, is not greater than 80 MW. For power-generating facilities determined to be under the jurisdiction of the state of California for property tax assessment purposes, the BOE determines the assessed value of the property, which is then used by the relevant county to assess and collect the appropriate amount of property taxes. In this case, the San Bernardino County assessor would assess and collect the appropriate amount of taxes. According to AFC section 5.10, under current law with exemptions for portions of the proposed ISEGS, property taxes are estimated at approximately $2.2 million per year. According to AFC section 5.10, once property taxes are assessed, tax monies would be allocated as follows:

- 39.66 percent to local schools;
- 31.74 percent to the local Educational Revenue Augmentation Fund;
- 20.96 percent to the San Bernardino County General Fund;
- 3.80 percent to Special Districts;
- 2.02 percent to the County Library; and
- 1.78 percent to flood control.

The additional property tax revenues generated by the proposed ISEGS would have a beneficial impact to San Bernardino County by increasing the amount of public funds available for community projects and spending by the county.

The proposed ISEGS's annual operations and maintenance (O&M) budget is expected to be approximately $340,500 (in 2007 dollars), of which it is assumed that $27,000 would be spent locally within San Bernardino County, California, and the remaining $313,500 within Clark County Nevada. The additional sales tax revenues generated by the proposed ISEGS would have a beneficial impact to both the San Bernardino and Clark Counties' local economies.

Operation of the proposed ISEGS would generate a beneficial impact by creating employment opportunities for local workers through local expenditures for materials, such as office supplies and services. According to AFC section 5.10, the proposed ISEGS would provide a total of approximately $5.4 million (in 2007 dollars) in operational payroll, at an average salary of $60,000 per year (including benefits) for the estimated 90 full-time employees. The additional revenues generated by employment and spending of the ISEGS would have a beneficial impact to both the San Bernardino and Clark County areas. However, the addition of 90 full-time jobs would not reduce unemployment rates within the study area as presented in **Table 4.9-3**, as the contribution of 90 full-time jobs would account for only 0.1 percent of the total unemployed workers (74,800) within the study area.

Physical impacts to public services and facilities are usually associated with population in-migration and growth in an area, which increase the demand for a particular service and lead to the need for expanded or new facilities. An increase in population in any given area may result in the need to develop new or alter existing public services and associated facilities to accommodate increased demand. The Socioeconomics analysis focuses on the proposed project's impacts to public services such as law enforcement, schools, and hospitals. The analysis of proposed ISEGS impacts to fire protection service levels is discussed within Section 4.15.

The required operational labor force would reside within the study area. As a result, no population increase would occur as a result of the proposed project, thereby eliminating the need for an increase in law enforcement services or facilities in the study area. In addition, according to AFC section 5.10, the San Bernardino County Sheriff's Department, which has primary responsibility for policing the proposed ISEGS site, did not express any concerns about the need for increased services as a result of the proposed ISEGS. Therefore, operation activities at the proposed ISEGS would not adversely impact the existing service levels of the San Bernardino County Sheriff's Department or the Las Vegas Municipal Police Department. Information on potential impacts to the County's fire and hazardous materials emergency response services is presented in Section 4.15.

The proposed ISEGS is expected to employ a total of 90 full-time employees from within the San Bernardino County and Clark County labor forces. Because all construction and operational employees are expected to already reside within the study area, the proposed ISEGS would not result in any direct population growth to the area that could generate a need for expanded school facilities within the CCSD or BVUSD enrollment areas. No impacts to schools would occur.

Any development (industrial or residential) within the BVUSD boundaries is currently charged a one-time assessment fee of $0.33 per square foot of principal building area. The only project structure that would qualify as a principal building area would be the administration/storage building, which is the only habitable structure. The administration/storage building (the only structure that could be defined as an occupied structure) is 9,682 square feet in size. Therefore, the proposed ISEGS would pay a one-time fee of $3,195 in school impact fees to the BVUSD. This is considered a beneficial socioeconomics impact of the proposed project.

The Saint Rose Hospital - Siena Campus, serves the proposed ISEGS site. As all operational employees are expected to already reside within the study area, no additional constraints or physical impacts would occur to the healthcare services or facilities provided by the Saint Rose Hospital - Siena Campus. Therefore, operation of the proposed ISEGS would have no impacts to hospital facilities.

Closure/Decommissioning Impacts

As described in Section 3, it is assumed decommissioning of the facility would occur in a phased sequential manner; work would start at Ivanpah 1, followed by similar work at Ivanpah 2 and then Ivanpah 3, while the later phases of demolition / restoration work are finished at Ivanpah 1 and Ivanpah 2. Therefore, work would pass sequentially across all three units, with phases of work occurring at the same time at different locations and would be temporary in duration. It is assumed that the number and type of workers required for closure and decommissioning activities would be similar to that described above for construction of the ISEGS. Also, the closure and decommissioning workforce would be drawn from the City of Las Vegas within Clark County, Nevada, as well as parts of surrounding rural areas in San Bernardino County, California.

As all workers are expected to reside within the ISEGS area, closure and decommissioning of the proposed ISEGS would not result in any direct population growth to the area that could generate a need for new or expanded public service facilities. As closure and decommissioning activities would be temporary and the number of workers anticipated would represent a small portion of the local available labor force, no direct, adverse impacts to the study area employment base would result from proposed project. In addition, no housing units would be located within the ISEGS site, therefore closure and decommissioning activities would not result in the removal of any housing units. All closure and decommissioning workers are expected to reside within the ISEGS area, and therefore would not need to move into the area requiring permanent housing.

BLM cannot speculate as to the long-term economic and fiscal effects that closure and decommissioning activities would have on the study area because future conditions are unknown. Upon permanent closure of the ISEGS, the beneficial socioeconomic operational impacts such as worker payroll, project expenditures, and local economic stimulus would no longer occur. It should be noted that closure and decommissioning of the ISEGS would likely require further environmental impact evaluation, and most likely would have some beneficial fiscal and non-fiscal impacts to the area.

Beneficial Impacts

Important public benefits discussed under the fiscal and non-fiscal effects section are O&M capital expenditures, construction payroll, and annual property and sales taxes. **Table 4.9-7** provides a summary of economic benefits of the ISEGS.

Table 4.9-7
Noteworthy Public Benefits Related to Ivanpah Solar Electric Generating System

Fiscal Benefits	
Estimated annual property taxes	$2.2 million per year
State and local sales taxes: Construction	$6.0 million
State and local sales taxes: Operation	$2,090 per year
School Impact Fee	$3,195
Non-Fiscal Benefits	
Total capital costs	$1,100 million
Construction payroll	$197 million
Operations payroll	$5.4 million
Construction materials and supplies	$77 million
Operations and maintenance supplies	$4.0 million per year
Direct, Indirect, and Induced Benefits	
Estimated Direct Employment	
Construction	An average of 474 jobs per month
Operation	90 full-time jobs
Estimated Secondary Employment	
Construction	528 jobs
Operation	12 jobs
Estimated Secondary Income	
Construction	$20.5 million
Operation	$470,150

4.9.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

With respect to population and employment, the necessary number of construction workers (an average of approximately 474 workers throughout the construction period) for the proposed project was a small fraction of the number of available construction workers within the expected commuting area (more than 230,000), and therefore no adverse impact to the workforce would occur. Although the Mitigated Ivanpah 3 Alternative would require approximately the same size workforce, it would require that workforce for a shorter duration, and therefore would also not cause an adverse impact.

Similarly, because these workers would reside within commuting distance, there would be no adverse impact on the availability of housing.

Like the proposed project, construction of the Mitigated Ivanpah 3 Alternative would have a beneficial impact on fiscal and economic effects by providing a construction payroll and sales taxes. Because approximately the same number and type of construction workers would be employed, and the same amount of materials would be purchased, the annual rate of these taxes would be the same for the proposed project and the Mitigated Ivanpah 3 Alternative. However, the duration of construction of the Mitigated Ivanpah 3 Alternative would be reduced by approximately 17 percent from that of the proposed project. Therefore, the beneficial impact of these taxes would also be reduced by approximately 17 percent.

Because construction of the Mitigated Ivanpah 3 Alternative would not result in population migration to the area, it would not adversely impact public services such as law enforcement, schools or hospitals.

Operations Impacts

Similar to construction, the number of operations workers employed at the proposed project (approximately 90) would constitute a small fraction of the available workforce, and would therefore not cause an adverse impact on that workforce, or housing needs for the workforce. The number of employees would also not be so large that it would beneficially impact unemployment rates in the local area. The employment level for operation of the Mitigated Ivanpah 3 Alternative would be approximately the same as that for the proposed project, and therefore the employment and housing impacts would be the same as those described for the proposed project.

Like the proposed project, operation of the Mitigated Ivanpah 3 Alternative would have beneficial impacts on fiscal and economic effects by providing a property tax to San Bernardino County, as well as payroll and sales taxes. For the proposed project, the annual property tax revenue to San Bernardino County was estimated to be approximately $2.2 million per year. Because the Mitigated Ivanpah 3 Alternative would be a smaller size and have a reduced output, it would be expected to generate a reduced amount of property tax revenue. However, the reduction would be small, and the overall impact on fiscal resources would still be beneficial. Payroll (approximately $5.4 million per year) and sales taxes (approximately $340,500 per year) associated with the operation of the proposed project would remain approximately the same under the Mitigated Ivanpah 3 Alternative. Overall, operation of the Mitigated Ivanpah 3 Alternative would have a beneficial impact on fiscal resources, but the benefit would be lower than that estimated for the proposed project.

Because operation of the Mitigated Ivanpah 3 Alternative would not result in population migration to the area, it would not adversely impact public services such as law enforcement, schools, or hospitals.

Closure/Decommissioning Impacts

The closure and decommissioning of the Mitigated Ivanpah 3 Alternative would not result in the addition of any population to the local area, and would therefore not have any impact on public services. The beneficial impacts to employment and fiscal resources would temporarily increase due to the increased workforce required for decommissioning, but would then cease altogether.

Beneficial Impacts

Like the proposed project, the Mitigated Ivanpah 3 Alternative would include the contribution to the local economy through the provision of construction and operations jobs, and increase in property and sales taxes. Because the duration of the construction period would be shortened, and overall project output reduced, the magnitude of the impact would be somewhat lower than that of the proposed project, but still beneficial.

4.9.2.3 Modified I-15 Alternative

Construction Impacts

With respect to population and employment, the necessary number of construction workers (an average of approximately 474 workers throughout the construction period) for the proposed project was a small fraction of the number of available construction workers within the expected commuting area (more than 230,000), and therefore no adverse impact to the workforce would occur. Although the Modified I-15 Alternative would require approximately the same size workforce, it would require that workforce for a shorter duration, and therefore would also not cause an adverse impact. Similarly, because these workers would reside within commuting distance, there would be no adverse impact on the availability of housing.

Like the proposed project, construction of the Modified I-15 Alternative would have a beneficial impact on fiscal and economic effects by providing a construction payroll and sales taxes. Because approximately the same number and type of construction workers would be employed, and the same amount of materials would be purchased, the annual rate of these taxes would be the same for the proposed project and the Modified I-15 Alternative. However, the duration of construction of the Modified I-15 Alternative would be reduced by approximately 17 percent from that of the proposed project. Therefore, the beneficial impact of these taxes would also be reduced by approximately 17 percent.

Because construction of the Modified I-15 Alternative would not result in population migration to the area, it would not adversely impact public services such as law enforcement, schools, or hospitals.

Operations Impacts

Similar to construction, the number of operations workers employed at the proposed project (approximately 90) would constitute a small fraction of the available workforce, and would therefore not cause an adverse impact on that workforce, or housing needs for the workforce. The number of employees would also not be so large that it would beneficially impact unemployment rates in the local area. The employment level for operation of the Modified I-15 Alternative would be approximately the same as that for the proposed project, and therefore the employment and housing impacts would be the same as those for the proposed project.

Like the proposed project, operation of the Modified I-15 Alternative would have beneficial impacts on fiscal and economic effects by providing a property tax to San Bernardino County, as well as payroll and sales taxes. For the proposed project, the annual property tax revenue to San Bernardino County was estimated to be approximately $2.2 million per year. Because the Modified I-15 Alternative would be a smaller size and have a reduced output, it would be expected to generate a reduced amount of property tax revenue. However, the reduction would be small, and the overall impact on fiscal resources would still be beneficial. Payroll (approximately $5.4 million per year) and sales taxes (approximately $340,500 per year) associated with the operation of the proposed project would remain approximately the same under the Modified I-15 Alternative. Overall, operation of the Modified I-15 Alternative would have a beneficial impact on fiscal resources, but the benefit would be lower than that estimated for the proposed project.

Because operation of the Modified I-15 Alternative would not result in population migration to the area, it would not adversely impact public services such as law enforcement, schools, or hospitals.

Closure/Decommissioning Impacts

The closure and decommissioning of the Modified I-15 Alternative would not result in the addition of any population to the local area, and would therefore not have any impact on public services. The beneficial impacts to employment and fiscal resources would temporarily increase due to the increased workforce required for decommissioning, but would then cease altogether.

Beneficial Impacts

Like the proposed project, the Modified I-15 Alternative would include the contribution to the local economy through the provision of construction and operations jobs, and increase in property and sales taxes. Because the duration of the construction period would be shortened, and overall project output reduced, the magnitude of the impact would be somewhat lower than that of the proposed project, but still beneficial.

4.9.2.4 No Action

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality (43 U.S.C. 1781 (b)) in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and could include consideration of another solar project.

- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project were not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. Construction methods, resulting impacts, and regulatory requirements associated with other renewable projects would be similar to those identified for the proposed ISEGS. However, as such, socioeconomic impacts associated with construction and operation of other renewable projects could be expected to be either similar when compared to the proposed ISEGS (no adverse impacts and providing positive fiscal benefits) or greater (resulting in direct, adverse impacts such as by causing a burden on community services). Furthermore, important public benefits discussed above under the fiscal and non-fiscal effects section and summarized above in **Table 4.9-7** would not occur within the study area.

4.9.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

The proposed ISEGS would comply with all applicable laws and regulations regulating socioeconomics during both facility construction and operation. Given the ISEGS projected 50-year life span, BLM cannot speculate about law and regulation compliance for facility closure and decommissioning activities.

4.9.4 Mitigation Measures

No mitigation measures have been identified for socioeconomic resources, as no direct, adverse socioeconomics impacts would occur as a result of the proposed ISEGS.

4.9.5 Summary

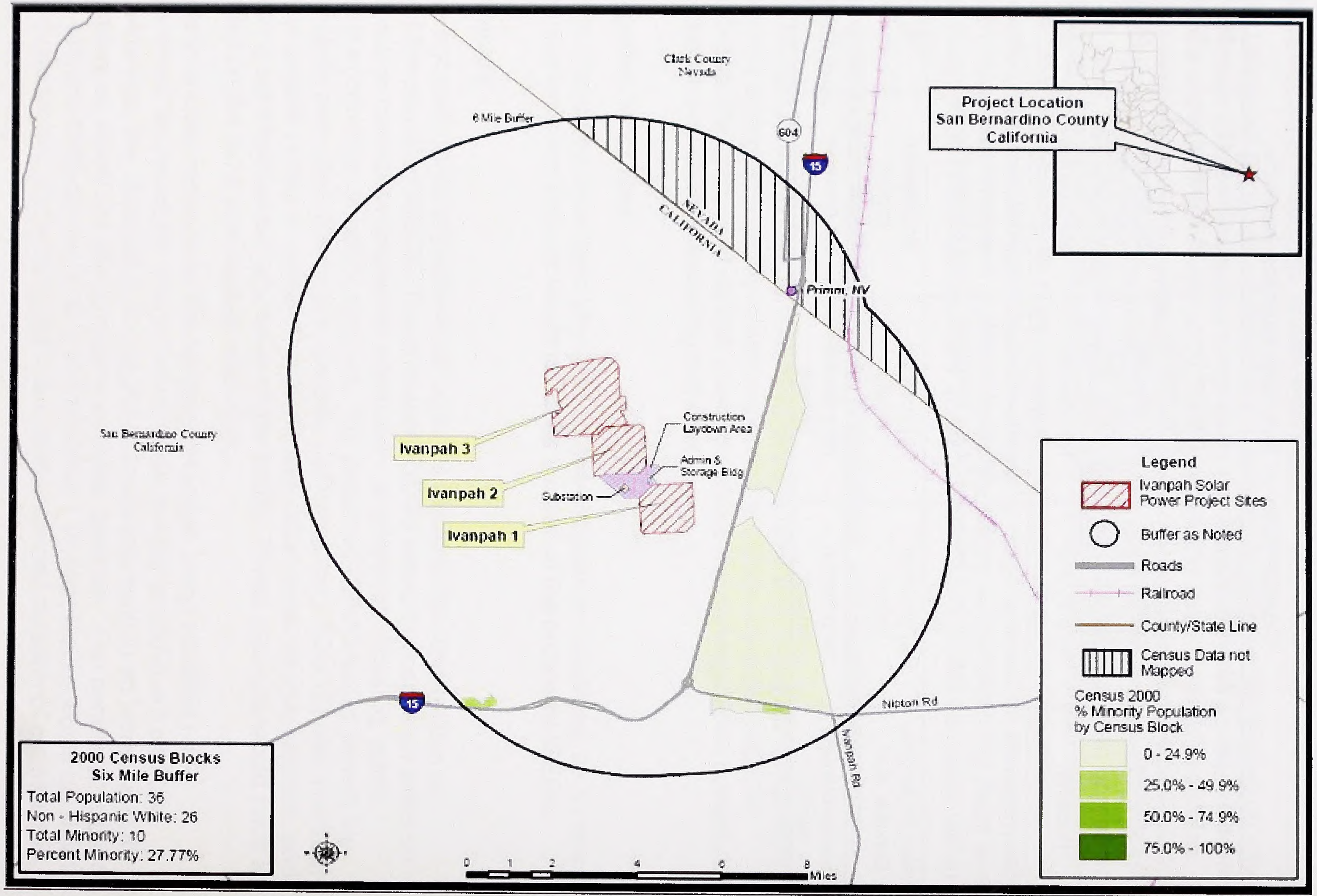
No adverse socioeconomic impacts would occur as result of the construction or operation of the proposed ISEGS. The proposed ISEGS would not cause an adverse direct, indirect, or cumulative impact on population, employment, housing, public finance, local economies, or public services. The proposed ISEGS would benefit the two-county study area (San Bernardino County, California, and Clark County, Nevada) and the local project vicinity in terms of an increase in local expenditures, payrolls, and taxation during construction and operation of the facility. These activities would have a positive effect on the local and regional economy.

The impacts to socioeconomics for the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be beneficial, due to the increase in local employment and tax revenues. However, the increase in employment would not result in an increase in the local population, so would not affect housing or public services. The beneficial impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be slightly lower than those for the proposed project, due to the reduced duration of construction and decommissioning.

Table 4.9-8
Comparison of Socioeconomics Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Employment	No adverse impact, slight beneficial impact	No adverse impact, slight beneficial impact	No adverse impact, slight beneficial impact	No potential impact.
Housing	No potential impact.	No potential impact.	No potential impact.	No potential impact.
Fiscal resources	Beneficial impact through property, payroll, and sales taxes.	Slightly lower than proposed project, but still beneficial	Slightly lower than proposed project, but still beneficial	No potential impact.
Police Protection, Schools, and Hospitals	No potential impact.	No potential impact.	No potential impact.	No potential impact.
Environmental Justice	No potential impact.	No potential impact.	No potential impact.	No potential impact.

Figure 4.9-1
Ivanpah Solar Power Project – Census 2000 Minority Population by Census Block – Six Mile Buffer


Clark County Nevada
Project Location
San Bernardino County
California
6 Mile Buffer
604
15
NEVADA
CALIFORNIA
Primm, NV
San Bernardino County California
Construction Laydown Area
Admin & Storage Bldg
Ivanpah 3
Ivanpah 2
Substation
Ivanpah 1
Nipton Rd
Ivanpah Rd
Legend
Ivanpah Solar Power Project Sites
Buffer as Noted
Roads
Railroad
County/State Line
Census Data not Mapped
Census 2000
% Minority Population
by Census Block
0 - 24.9%
25.0% - 49.9%
50.0% - 74.9%
75.0% - 100%
2000 Census Blocks
Six Mile Buffer
Total Population: 36
Non - Hispanic White: 26
Total Minority: 10
Percent Minority: 27.77%
0
1
2
4
6
8
Miles

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: California Energy Commission Statewide Power Plant Maps 2009 - Census 2000 PL 94-171 Data - Matrix PL2

4.10 Soil and Water

Introduction

This section analyzes potential impacts to soil and water resources from the construction or operation of the ISEGS project. Where the potential of an adverse impact is identified, mitigation measures are identified which would avoid or reduce the impact.

Resource-Specific Project Description

Project Hydrologic Setting

The ISEGS project would be a 400-MW capacity solar electric generating system that would be constructed in three phases. Ivanpah 1 and 2 would be constructed as 100-MW capacity power plants and each would consist of approximately 55,000 heliostats made of 110,000 mirrors, double mounted on poles concentrically aligned in rows around a centralized solar power tower (CH2M Hill 2009a). Ivanpah 3 would be constructed as a 200-MW capacity power plant, and would consist of approximately 104,000 heliostats made of 208,000 mirrors, double mounted on poles concentrically aligned in rows around five separate solar power towers (CH2M Hill 2009a). Each heliostat would be approximately 7.2 feet high and 10.5 feet wide and would be equipped with a separate tracking and aiming system (CH2M Hill 2009a). A one-quarter inch diameter cable, strung between heliostats above the ground, would transmit information to and from each heliostat. Ungraded access pathways would be established between every other concentric row of heliostats (CH2M Hill 2009a). Dirt roads would be graded diagonally through the heliostat rows.

Construction of the proposed power plants would involve approximately 4,073 acres (6.4 square miles): 914 acres for Ivanpah 1, 920.7 acres for Ivanpah 2, and 1,836 acres for Ivanpah 3 (CH2M Hill 2009a). In addition, the administration building, warehouse, substation, gas tap and metering stations, groundwater production wells, access roads and re-routed trails, and linear facilities would require approximately 402 acres. Approximately 321 acres would be temporarily disturbed by linear facilities, road improvements, and the laydown area. The total area of permanent disturbance would be approximately 3,713 acres, including linear facilities (CH2M Hill 2009a). An additional 38.9 acres would be encompassed by the existing transmission line corridor (CH2M Hill 2009a).

A power block would be located at the approximate center of project phases Ivanpah 1, 2, and 3. The power blocks of Ivanpah 1 and 2 would consist of a centralized solar power tower and receiver boiler, Rankin-cycle stream turbine-generator, an air-cooled condenser, concrete holding basins, and other auxiliary equipment (CH2M Hill 2009a). The Ivanpah 3 power block would consist of the same elements as would Ivanpah 1 and 2, except it would have five solar power towers with the power block located at the central power tower (CH2M Hill 2009a). The administration building, warehouse, and substation would be located between Ivanpah 1 and 2 in the logistics area. In addition, each power block would have a backup diesel-fired engine to power auxiliary equipment such as the boiler recirculation pumps and firewater pumps in the event of an emergency or when power is unavailable. Each power plant would also include a small natural gas fired startup boiler to provide heated water for plant startup and during times of cloud cover. This system is designed to minimize water use by using an air-cooled condenser for condensation of steam. Water consumption would primarily be used for boiler make up water and washing the heliostat mirrors.

Storm Water Potential

The existing storm water flow across the proposed project is generally towards the east across an alluvial fan that has developed in conjunction with the uplift and erosion of the Clark Mountains. Storm water is conveyed across the fan as sheet flow and through numerous ephemeral wash channels, and can reach the Ivanpah playa during heavy rain events. During major storm events, the ephemeral washes can flow for periods of a few hours to 24-hours with the possibility of flash floods and mass wasting. The ephemeral washes on the alluvial fan have been determined to be non-jurisdictional features by the Army Corps of Engineers under Section 404 of the Clean Water Act (USACE 2009) and are, therefore, waters of the State. For further discussion on the jurisdictional determination, please refer to Section 4.3.

A total of 1,973 ephemeral washes were mapped in the project area and were categorized by the applicant on the basis of width. A summary of this categorization is presented below in **Table 4.10-1**.

Table 4.10-1
Summary of Ephemeral Washes at the Proposed Project Site
(All Washes Classified as Waters of the State)

Wash Category and Width	Number of Ephemeral Washes Mapped						
	Ivanpah 1	Ivanpah 2	Ivanpah 3	Utility Corridor	Colosseum Road	Substation and Admin. Area	Total
Category 1 36 to 85 feet	0	3	4	1	0	0	8
Category 2 21 to 35 feet	0	4	7	1	0	0	12
Category 3 11 to 20 feet	10	22	32	8	9	13	94
Category 4 5 to 10 feet	95	130	171	16	11	36	459
Category 5 1 to 4 feet	397	292	449	29	36	197	1,400
					Total		**1,973**

Source: CH2M Hill 2009a.

The size of the washes appears to increase topographically upgradient, with the greatest number of washes occurring in Ivanpah 3, followed by Ivanpah 1, then Ivanpah 2. This indicates that the highest volume and velocity storm water flows occur in Ivanpah 3. However, not all of the washes appear to be active and storm water flow likely migrates from one wash to create a new wash over time. No other wetlands or water were identified at the proposed project site (CH2M Hill 2009a).

The proposed project is located in Federal Emergency Management Agency (FEMA) Zone D, which is classified as areas with possible flood hazards. Although a flood hazard analysis has not yet been conducted by FEMA for this area, a hydrologic study and modeling have been completed by the applicant. This work indicates that the alluvial fan has both active and inactive areas that can be subject to intense storm water flows (WYA 2009a; WYA 2009b). Storm water flow across the active portion of the fan is controlled by runoff generated within the Clark Mountain sub-watersheds above the alluvial fan and from runoff generated on the alluvial fan itself (WYA 2009c). Fifteen sub-watersheds, totaling 13,900 acres, were estimated to be contributing to storm water flows that could affect the proposed project (WYA 2009c).

Soil Erosion Potential

The Natural Resources Conservation Service classifies soils at the project sites as Arizo loamy sand and Popups sandy loam (NRCS 2008). According to the Unified Soils Classification System (USCS), the soils are clayey, silty sands (SC-SM) and silty, sandy gravels (GM). The Arizo loamy sand is excessively well drained and the Popups sandy loam is well drained. Development activities, including compaction associated with vehicle access, grading (in limited areas), removal of vegetation, and modification of precipitation patterns would generally result in reducing soil infiltration rates, and increasing the volume and velocity of runoff associated with storm events. If used, soil binders would also tend to reduce the soil infiltration rate (UNLV 2002).

To reduce the impact of these development activities on infiltration and runoff, the applicant proposes to implement LID methods (CH2M Hill 2009a). The goal of LID is to maintain the function and value of the natural drainage system while minimizing the risk of accelerated soil erosion and increased storm water runoff. By using the naturally developed drainage features and patterns, LID designs can reduce storm water infrastructure construction and long-term maintenance costs. Towards this end, the applicant has proposed the following methods (CH2M Hill 2009a):

Vegetation. During construction, existing vegetation and plant roots would be left in place to the extent possible and cut only as necessary to allow clear movement of the heliostats. Native plants would be allowed to grow so long as their growth did not interfere with the heliostat operation or maintenance. An herbicide would be used to eradicate noxious weeds and non-native species.

Grading. Natural drainage features would be maintained to the extent possible. Grading would be designed to maintain natural sheet flow as much as practicable. Fill required in the heliostat fields would be compacted to closely match existing compaction, infiltration, and permeability. Hydro-mulch and soil binding and weighting agents would be used to protect areas disturbed by grading.

Even with these LID methods employed, project development would likely have effects that result in reduced storm water infiltration and increased runoff. Although grading would be minimized to the extent necessary, the project would still cut, move, and reuse approximately 135,000 cubic yards of soil (CH2M Hill 2009a) in a 170-acre area of

Ivanpah 3. An additional 110,000 cubic yards would be cut and moved through the remainder of the project. To minimize these impacts, all soil cut would be reused onsite. In addition, the applicant estimated that approximately 412,600 cubic yards of vegetation would be cut, mulched, and used in erosion control. Vehicles used in the development of the site and ongoing operations after construction is complete would include: a skid mounted, 23,500 pound (lb) GT-25XP Gyro Trac for mowing vegetation; a 48,000 lb Caterpillar 550 Wheel Harvester modified to be a heliostat mirror washing vehicle that could pull a 500-gallon water tank; a 47,000 lb sonic heliostat pole installer; golf cart sized utility vehicles; and a 60,126 lb Grove 540E crane for heliostat mirror installation.

Roads and Pathways. Access roads would be graded to follow existing topography. Ungraded maintenance pathways would be used to maintain and wash the heliostats. Vehicles designed to minimize soil compaction would be used (i.e., high flotation tires or tracks). The vehicles conducting the heliostat washing would travel at less than 10 miles per hour (mph) to minimize dust generation. For additional information on dust management, please refer to Section 4.1.

Post Installation and Heliostat Construction. The applicant is currently designing and evaluating methods of post installation and heliostat construction. The results are not available for this analysis, but are expected to be submitted at a later date. The design and construction are expected to be consistent with the goal of LID.

Project Water Supply

All water for the construction and operation of the power plants would be drawn from one of two wells located on the northwest corner of Ivanpah 1 (CH2M Hill 2009a). One well would be used as the primary water supply with the other well used as a backup for redundancy. A monitoring well would be installed approximately 2,300 feet northeast of the project's wells to monitoring the project's potential impact to local groundwater levels (CH2M Hill 2009a). Pumped water would be stored for each power block in a 250,000 gallon combined raw water and fire water tank (CH2M Hill 2009a). Approximately 100,000 gallons of this water would be designated for potable and process water use (CH2M Hill 2009a).

During project construction, potable (primarily drinking) water would be provided by construction contractors purchased from an offsite source (CH2M Hill 2009a). The project construction workforce size would be 474 persons on average and 959 persons during peak construction times (CH2M Hill 2007). The applicant estimates that each construction worker would require about 1 to 2 gallons of water per day (gpd) for a total of about 1,000 to 2,000 gpd during peak construction (CH2M Hill 2009j). This equates to maximum need of about 3.3 acre-feet (AF) for the construction of Ivanpah 1 or 2 and 2.7 AF for the construction of Ivanpah 3.[26]

During plant operation, potable water would be pumped from one of the onsite groundwater wells and filtered and purified to meet the project's workforce potable water needs (CH2M Hill 2009a). The estimated annual potable water demand during plant operation would be approximately 3 AF for all three project phases.

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[26] 3.3 AF is calculated as 2,000 gpd times 27 months times 20 workdays per month.
2.7 AF is calculated as 2,000 gpd times 22 months times 22 workdays per month.

Groundwater from onsite wells would also be used to meet the project's construction water demands. Construction of each phase of the proposed project is expected to take 24 months. **Table 4.10-2** below presents a summary of the water that would be used during all three phases of construction. Groundwater would be used daily for dust suppression and vehicle washing. During hydrostatic testing of the project piping, up to 47,000 gallons of water could be used (CH2M Hill 2007). The used water from this testing would either be trucked to a wastewater treatment and disposal facility or allowed to percolate/evaporate onsite, pending analytical results of the used water. If discharged to land, discharge of this water would be subject to the requirements of the State Water Resources Control Board's general permit number 2003-003-DWQ.

Table 4.10-2
Estimated Daily and Annual Construction Water Demands

Project Phase	Average Daily Construction Water Demand (gallons)	Water Supply Source
Ivanpah 1	99,333	New Onsite Groundwater Wells
Ivanpah 2	99,333	
Ivanpah 3	194,000	

Source: CH2M Hill 2007.
Note: An additional 47,000 gallons could be used for hydrostatic testing of the proposed project's piping and additional water could be required for mirror washing if one project phase is constructed while another is operational.

Construction of each phase of the project would occur sequentially. Grading is expected to take approximately four to five months for Ivanpah 1 and the common area, three to four months for Ivanpah 2, and five months for Ivanpah 3 (Stewart 2009).

The project also proposes to use groundwater during plant operations. The maximum volume of groundwater that would be extracted and used by the project has been estimated at approximately 18 AFY for each of the 100-MW plants and 37.5 AFY for the 200-MW plant. **Table 4.10-3** below summarizes the volume of water the project proposes to use for all power plant process and potable water needs. The applicant estimated the combined maximum annual use to be 76.4 AFY, but rounded this number up to 100 AFY in the AFC and supplemental documents (CH2M Hill 2007; CH2M Hill 2009j).

Table 4.10-3
Estimated Annual Operational Water Demands Project Water Sources and Use[1]

Water Use	Water Source	Approximate Daily Average (gpm)[2]	Approximate Annual (AF)[3]
Ivanpah 1 100-MW Heliostat Process & Washing	Groundwater Wells	12.5	18
Ivanpah 2 100-MW Heliostat Process & Washing	Groundwater Wells	12.5	18
Ivanpah 3 200-MW Heliostat Process & Washing	Groundwater Wells	23	37.5
Potable Water Service (for employee use)	Groundwater Wells	1.8	2.9
Total Plant Operational Water Demand (all 3 phases combined)		49.8	76.4

Source: CH2M Hill 2007.
gpm = gallons per minute
Note: Based on 3,640 hours of operation per year (10 hours per day, 7 days per week).

In Data Response Set ID, the applicant doubled the number of mirrors on each heliostat and changed the mirror array fields from what was originally proposed in the AFC (CH2M Hill 2008d). This change in design resulted in increasing the proposed mirror surface area by 61.4 percent. However, the applicant did not revise the estimated annual water use to address the need for additional mirror washing, and stated that 100 AFY would provide sufficient water. During workshops, the applicant proposed a more open-ended limit to the volume of water the project could use, such as one that uses a rolling average, but also stated that 100 AFY would provide a sufficient volume of water for the proposed project.

Groundwater and water from the oil/water separator would be passed through a deionizing treatment system and mixing bed before being stored in a boiler make up tank (CH2M Hill 2007). Water from the boiler makeup water storage tank would provide the high quality, de-ionized water with no additives for mirror washing and steam production. Approximately 16,000 gallons of water per night would be used for mirror washing. To minimize the amount of water use, a pressure washer or other method would be used. **Table 4.10-4** presented below shows the expected volume of wash water that would be used during each wash cycle.

Table 4.10-4
Estimated Volume of Mirror Wash Water Used
(based on 2.5 gallons of water used for each heliostat)

Location	Number of Heliostats	Plant Area (acres)	Wash Water Volume (gallons per wash-cycle)	Wash Water Volume (gallons per acre per wash-cycle)
Ivanpah 1	55,000	913.5	137,500	151
Ivanpah 2	55,000	920.7	137,500	149
Ivanpah 3	104,000	1,836.3	260,000	142

Sources: CH2M Hill 2008j; CH2M Hill 2007; CH2M Hill 2009a

A wash cycle is defined by the applicant as the 2-week interval during which each heliostat within an array would be washed one time (CH2M Hill 2007). The applicant estimates that 100 heliostats can be washed per hour with 4 trucks working 10 hours per night at about 0.4 mph (CH2M Hill 2008j). Due to the high evaporation rates and minimal amount of water used, the applicant estimated that the wash water would evaporate at or just below the ground surface. The expected physical and chemical composition of the water reaching the ground surface is presented below in **Table 4.10-5**.

Table 4.10-5
Expected Mirror Wash Water Quality

Parameter	Concentration
Hardness as $CaCO_3$	0.005 mg/l
Copper	0.01 mg/l
Iron	0.03 mg/l
Silica	0.3 mg/l
Conductivity	<1μS/cm
pH	8.5

Source: CH2M Hill 2008j. Note: mg/l = milligrams per liter; μS/cm = microsiemens per centimeter.

Wastewater

The applicant decided to forego the package sanitary treatment system originally proposed in the AFC for the installation of a septic tank and leach field treatment system (CH2M Hill 2009a). The sanitary wastewater from the sinks, showers, and toilets would be processed onsite by the septic and leach field system located near the administration building (CH2M Hill 2009a). This system would be installed in accordance with San Bernardino County and RWQCB regulations and BMPs.

Residual sludge would be removed by a disposal service. Portable toilets would be located at each power block area (CH2M Hill 2009a). These toilets would be serviced regularly under contract by a waste management company (CH2M Hill 2009a). No wastewater would be discharged offsite (CH2M Hill 2009a).

All process water from plant floor drains, hub drains, sumps, and piping would be reused to the extent practical (CH2M Hill 2007). The process water would be sent through an oil/water separator and then stored in a raw water and fire water tank for later treatment and use in the steam boiler. Boiler blowdown would be discharged to a flash tank to control the concentration buildup of solids and silica (CH2M Hill 2009a).

Contaminated Soil and Groundwater

The 'old' and 'new' Molycorp Mine wastewater discharge ponds are between four to six miles away from the proposed project site, in the southern part of the Ivanpah playa. A groundwater plume associated with these ponds contains elevated total dissolved solids (TDS), nitrate, strontium, barium, and radium concentrations and is currently being remediated under a RWQCB Cleanup and Abatement Order (RWQCB 1998a; RWQCB 1998b). In addition, between one to two miles downgradient from the proposed project site is the Ivanpah playa beneath which groundwater TDS is elevated beyond California acceptable drinking water standards. Please refer to Sections 4.8 and 4.14 for additional soil and groundwater contamination information.

Applicable Laws, Regulations, and Supplemental Authorities

The following federal, state, and local laws, regulations, and guidance have been established for the ISEGS project and similar facilities to ensure the best and appropriate use and management of both soil and water resources. Additionally, these requirements are specifically intended to protect human health and the environment. The potential for project compliance with these regulations is a major component of the evaluation of the acceptability of the ISEGS project with respect to the use and management of soil and water resources.

Table 4.10-6
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Laws or Regulations	Description
Federal Regulations	
Clean Water Act (33 USC Section 1257 et seq.)	The Clean Water Act (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of storm water and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the CWA under the Porter-Cologne Water Quality Control Act of 1967. The CWA also establishes protection of navigable waters through Section 401. Section 401 certification through the Army Corps of Engineers and RWQCB is required if there are potential impacts to surface waters of the State and/or Waters of the United States, such as perennial and ephemeral drainages, streams, washes, ponds, pools, and wetlands. The Army Corps and RWQCB can require impacts to these waters to be quantified and mitigated.
Resource Conservation and Recovery Act, 40 CFR Part 260 et seq.	The Resource Conservation Recovery Act (RCRA) is a comprehensive body of regulations that give EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous solid wastes.
Department of Energy 10 CFR Part 1022	Establishes the DOE's Compliance with Floodplain and Wetland Environmental Review Requirements.
State Regulations	
California Constitution, Article X, Section 2	This section requires that the water resources of the State be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
The Porter-Cologne Water Quality Control Act of 1967, Water Code Sec 13000 et seq.	Requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable. Section 13000 also states that the State must be prepared to exercise its full power and jurisdiction to protect the quality of the waters of the State from degradation.
California Water Code Section 13050	Defines "waters of the State."

Applicable Laws or Regulations	Description
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Lahontan Region (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning. The following chapters are applicable to determining appropriate control measures and cleanup levels to protect beneficial uses and to meet the water quality objectives: Chapter 2, Present and Potential Beneficial Uses; Chapter 3, Water Quality Objectives, and the sections of Chapter 4, Implementation, entitled "Requirements for Site Investigation and Remediation," "Cleanup Levels," "Risk Assessment," "Stormwater Problems and Control Measures," Erosion and Sedimentation," "Solid and Liquid Waste Disposal to Land," and "Groundwater Protection and Management."
California Water Code Section 13260	Requires filing, with the appropriate RWQCB, a report of waste discharge that could affect the water quality of the state unless the requirement is waived pursuant to Water Code section 13269.
California Code of Regulations, Title 23, Division 3, Chapter 30	This chapter requires the submission of analytical test results and other monitoring information electronically over the internet to the SWRCB's Geotracker database.
State Water Resources Control Board General Permit CAS000002.	The SWRCB regulates storm water discharges associated with construction projects affecting areas greater than or equal to 1 acre to protect state waters. Under General Permit CAS000002, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for storm water discharges associated with construction activity. Projects can qualify under this permit if specific criteria are met and an acceptable SWPPP is prepared and implemented after notifying the SWRCB with a Notice of Intent.
State Water Resources Control Board 2003-003-DWQ	This general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include piping hydrostatic test water.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15 specifies Primary and Secondary Drinking Water Standards in terms of Maximum Contaminant Levels (MCLs). These MCLs include TDS ranging from a recommended level of 500 milligrams per liter (mg/l), an upper level of 1,000 mg/l and a short term level of 1,500 mg/l. Other water quality MCLs are also specified, in addition to MCLS specified for heavy metals and chemical compounds.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15 applies to waste discharges to land and requires the Regional Board issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
Local Regulations	
County of San Bernardino General Plan and Development Code	Grading in San Bernardino County is subject to terms and conditions of San Bernardino County's General Plan, Development Code and California Building Code, based upon the 2006 International Building Code. Although the proposed site is located on federal land, county regulations for public health and safety are considered to be applicable to the project. If a county grading permit is required, the grading plan would need to be completed in compliance with San Bernardino County's General Plan and Development Code.

Applicable Laws or Regulations	Description
California Safe Drinking Water Act and San Bernardino County Code Title 3, Division 3, Chapter 6, Public Water Supply Systems	Requires public water systems to obtain a Domestic Water Supply Permit. The California Safe Drinking Water Act requires public water systems to obtain a Domestic Water Supply Permit. Public water systems are defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out the year. California Department of Public Health (CDPH) administers the Domestic Water Supply Permit program, and has delegated issuance of Domestic Water Supply Permits for smaller public water systems in San Bernardino County to the County. Under the San Bernardino County Code Title 3, 5.15-6 Division 3, Chapter 6, Public Water Supply Systems, the County Department of Environmental Services monitors and enforces all applicable laws and orders for public water systems with less than 200 service connections. The proposed project would likely be considered a non-transient, non-community water system.
San Bernardino County Title 3, Division 3, Chapter 6,Article 5, Desert Groundwater Management	To help protect water resources in unregulated portions of the desert while not precluding its use, the County adopted this article. This article requires a permit to locate, construct, operate, or maintain a new groundwater well within the unincorporated, unadjudicated desert region of San Bernardino County. CEQA compliance must be completed prior to issuance of a permit, and groundwater management, mitigation, and monitoring may be required as a condition of the permit. The ordinance states that it does not apply to "groundwater wells located on Federal lands unless otherwise specified by inter-agency agreement." The BLM and County entered into a Memorandum of understanding (MOU) that provides that the BLM will require conformance with this code for all projects proposing to use groundwater from beneath public lands.
San Bernardino County Development Code Section 82.13.080, Soil Erosion and Sediment Control Plans/Permits	Section 82.13.080 establishes regulations and procedures to control human existing and potential induced accelerated erosion. Elements of this ordinance include project planning, preparation of Soil Erosion and Sediment Control Plans, runoff control, land clearing, and winter operations.
San Bernardino County Ordinance Code, Title 3, Division 3, Chapter 8, Waste Management, Article 5, Liquid Waste Disposal	This ordinance requires the following compliance for all liquid waste disposal systems: (1) compliance with applicable portions of the Uniform Plumbing Code and the San Bernardino County Department of Environmental Health Services (DEHS) standards; (2) approval by the DEHS and building authority with jurisdiction over the system; or (3) for alternative systems, approval by the DEHS, the appropriate building official of this jurisdiction, and the appropriate California RWQCB.
San Bernardino County Ordinance Code, Title 6, Division 3, Chapter 3, Uniform Plumbing Code	This ordinance describes the installation and inspection requirements for locating disposal/leach fields and seepage pits.
State Policies and Guidance	
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 IEPR, consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they will approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound."

Applicable Laws or Regulations	Description
State Water Resources Control Board Res. No. 68-16	The "Antidegradation Policy" mandates that: 1) existing high quality waters of the State are maintained until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonable affect present and anticipated beneficial uses, and will not result in waste quality less than adopted policies; and 2) requires that any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters, must meet WDRs which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur and b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.
State Water Resources Control Board Res. 75-58	The principal policy of the SWRCB that addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976, by Resolution 75-58). This policy states that use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound.
State Water Resources Control Board Res. No. 88-63	States that all groundwater and surface water of the State are considered to be suitable for municipal or domestic water supply with the exception of those waters that meet specified conditions.
State Water Resources Control Board Res. 2005-0006	Adopts the concept of sustainability as a core value for State Water Board programs and directs its incorporation in all future policies, guidelines, and regulatory actions.
State Water Resources Control Board Res. 2008-0030	Requires sustainable water resources management such as LID and climate change considerations, in all future policies, guidelines, and regulatory actions. Directs Regional Water Boards to "aggressively promote measures such as recycled water, conservation and LID Best Management Practices where appropriate and work with Dischargers to ensure proposed compliance documents include appropriate, sustainable water management strategies."
The California Safe Drinking Water and Toxic Enforcement Act	The California Health & Safety Code Section 25249.5 et seq. prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The RWQCB administers the requirements of the Act.

4.10.1 Affected Environment

The ISEGS project would be located in the Ivanpah Valley in the eastern Mojave Desert in San Bernardino County, California, near the California/Nevada border (**Figure 4.10-1**). This part of the Mojave Desert is federal land administered by the BLM. Water resources in this area are extremely limited and vegetation sparse. Due to these limitations, there is a need for a higher degree of water use management and additional protection against accelerated soil erosion.

The proposed project would be developed on an alluvial fan in the Ivanpah Valley. The Ivanpah Valley extends across the California state line and into Nevada and is part of a larger hydrologic system that includes Jean Lake Valley (CH2M Hill 2007). Precipitation in the surrounding mountains provides the Ivanpah Valley with water. Surface water runoff of mountain precipitation flows through washes and discharges to and infiltrates into the alluvium-filled valley. The Ivanpah Valley is topographically closed. Excess surface flow drains to the Ivanpah, Roach, and Jean Dry Lakes where it evaporates and leaves behind a hard lakebed (desert playa). The Ivanpah playa is now a world-class landsailing location due to the topographic flatness of the playa and high winds that can develop in this area.

The Ivanpah Valley is approximately 569,000 acres in size. Jean and Primm are the largest communities in the valley. The ISEGS project would be located near Primm and the Primm Valley Golf Club, a 22-acre facility. The basin is bound by several mountains: the Clark Mountains, Ivanpah Mountains, McCullough Range, Spring Mountains, New York Mountains, Sheep Mountain, and the Bird Spring Range. Several northwest-trending faults transect the basin: the State Line, Ivanpah, and Clark Mountain faults (DWR 2003).

Groundwater from the Ivanpah Valley Groundwater Basin (IVGB) is the primary natural water supply for the valley region. The groundwater occurs in the Quaternary alluvium of the basin, which has a maximum thickness of at least 8,000 feet (ENSR 2007). Groundwater generally flows towards the northeast and may be impeded by the northwest trending faults (DWR 2003). At the proposed project location, depth to groundwater appears to vary from approximately 215 to 715 feet below ground surface (bgs), with depth increasing upslope along the alluvial fan (Broadbent 2002). Groundwater in the IVGB appears to be unconfined with several local semi-confined areas, such as in the vicinity of Jean Dry Lake (URS 1990). Transmissivity of the IVGB aquifer, estimated from well tests, ranges from 2,300 to 100,000 gallons per day per foot (gpd/ft) (URS 1990). Higher transmissivity values occur in the southern (California) portion of the basin (URS 1990). On average, transmissivity across the IVGB appears to be on the order of 20,000 gpd/ft (URS 1990). The storage capacity on the California side of the valley of the IVGB is estimated to be 3.09 million AF (DWR 2003). The storage capacity on the Nevada side of the basin has not been estimated.

Precipitation supplies water to the basin. There is no underflow water supply to the basin (Glancy 1968). Recharge from precipitation occurs by infiltration of mountain runoff across the alluvial deposits and through ephemeral washes. Recharge from precipitation on the valley floor is minimal. Direct recharge from rainfall on the valley floor is substantially less than the potential rate of evapotranspiration and potential for soil moisture retention. When runoff or precipitation does reach the dry lakes, infiltration to groundwater is negligible and most of the water is removed by evaporation (Glancy 1968). Groundwater discharge from the basin occurs mainly through pumping and underflow towards the Las Vegas Valley (Glancy 1968).

The Ivanpah and Roach playas may seasonally contain surface water, but there are no perennial surface flows to these playas. During infrequent heavy rains, storm water eventually drains across the alluvial fans to the playas. Surface desiccation cracks are present in the Ivanpah playa, and large desiccation cracks may be located below the surface that cause sinkholes to develop (Broadbent 2009). Seasonal springs are present along the base of the Clark Mountains, up slope and hydraulically upgradient from the proposed project site. These springs occur in areas of consolidated rock and are estimated to flow at a rate of no more than 5 gallons per minute (gpm). The discharge from the springs is inadequate to sustain surface flow for a substantial distance (Glancy 1968).

The natural groundwater quality varies widely, but can be characterized as predominated by cations of sodium and calcium with a bicarbonate anion (DWR 2003). Elevated concentrations of fluoride and sodium occur in parts of the basin (DWR 2003). In the vicinity of the Ivanpah playa, the groundwater is saltier and characterized as sodium chloride (DWR 2003). TDS in the IVGB range from 300 to 500 mg/l, and can be as high as 7,702 and 27,501 mg/l in the vicinity of Ivanpah playa and in the northern part of the basin (DWR 2003). TDS at the project site is estimated to be between 369 to 600 mg/l, based on water samples from Colosseum wells # 1 and #2 located near the proposed project site (Broadbent 2002).

Molycorp Mine, operated by Molycorp Minerals LLC, is a lanthanide mining and milling operation. Molycorp Mine discharged wastewater through a pipeline to ‘old’ evaporation ponds in the Ivanpah playa between 1980 to 1987, and later discharged wastewater to ‘new’ evaporation ponds in the playa between 1988 to 1998 (RWQCB 1998a). The RWQCB Cleanup and Abatement Order No. 6-98-20 requires abatement of a groundwater plume that developed beneath the old evaporation ponds. This plume contains TDS, nitrate, strontium, barium, and radium in concentrations above the California Maximum Contaminant Levels (MCLs) (RWQCB 1998a). Nitrate levels above the MCLs are present in the groundwater beneath the new evaporation ponds (RWQCB 1998b). Sediments at both ponds contain lanthanides and radionuclides (RWQCB 1998b). Most of the non-natural contamination in the IVGB is the result of discharge to these ponds.

A wastewater treatment plant (WWTP) for the community of Primm, Nevada, is located approximately six miles northeast of the proposed project site on the Nevada side of the Ivanpah Valley. The plant processes wastewater from three casino properties, fast food outlets, a shopping mall, convenience stores, gas stations, a fire station, RV park, and an employee apartment complex (Nevada 2008). The plant is capable of producing up to 1.0 million gpd of secondary treated wastewater, but its actual operational discharge is about half this volume (560 AF/y) (NDEP 2008). Up to 30,000 gpd (33.6 AF/y) of this wastewater is used as make up water at the Nevada Energy Bighorn power plant, approximately 1.8 miles northeast of the WWTP (BWPC 2008; NDEP 2009). The Nevada Energy plant is a 600-MW capacity, natural gas fired, dry-cooled, combined-cycle facility (NDEP 2009).

The beneficial uses of the surface water and groundwater in the Ivanpah Valley have been defined in the 2005 *Water Quality Control Plan for the Lahontan Region, North and South Basins* (the Basin Plan). The beneficial use designations for surface water and groundwater in the Ivanpah Valley are presented below in **Table 4.10-7**.

Table 4.10-7
RWQCB Basin Plan Beneficial Use Designation for the Ivanpah Valley

Beneficial Use Designation	Description
Surface Water	
Groundwater Recharge	Beneficial uses of waters used for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
Flood Peak Attenuation/Flood Water Storage	Beneficial uses of riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters.
Wildlife Habitat	Beneficial uses of waters that support wildlife habitats including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.
Municipal and Domestic Supply	Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.
Freshwater Replenishment	Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
Water Quality Enhancement	Beneficial uses of waters that support natural enhancement or improvement of water quality in or downstream of a water body including, but not limited to, erosion control, filtration and purification of naturally occurring water pollutants, streambank stabilization, maintenance of channel integrity, and siltation control.
Rare, Threatened, or Endangered Species	Beneficial uses of waters that support habitat necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened or endangered.
Cold Freshwater Habitat	Beneficial uses of waters that support cold water ecosystems including, but not limited to, reservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.
Warm Freshwater Habitat.	Beneficial uses of waters that support warm water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.
Inland Saline Water Habitat	Beneficial uses of waters that support inland saline water ecosystems including, but not limited to, preservation and enhancement of aquatic saline habitats, vegetation, fish, and wildlife, including invertebrates.
Water Contact Recreation	Beneficial uses of waters used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, waterskiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.
Noncontact Water Recreation	Beneficial uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.
Commercial and Sportfishing	Beneficial uses of waters used for commercial or recreational collection of fish or other organisms including, but not limited to, uses involving organisms intended for human consumption.

Beneficial Use Designation	Description
Groundwater	
Municipal and Domestic Supply	Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.
Industrial Service Supply	Beneficial uses of waters used for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, geothermal energy production, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.
Freshwater Replenishment	Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Source: RWQCB2005.

The Basin Plan gives equal priority to each beneficial use of the surface water and groundwater. Included in the definition of surface water are playas and ephemeral washes. As presented in the table above, the desert washes provide beneficial functions and values such as groundwater recharge, flood peak attenuation and floodwater storage, and wildlife habitat.

4.10.2 Environmental Consequences

Methodology

This section provides an evaluation of the expected impacts to soil and water resources that would be caused by construction, operation, and maintenance of the project. BLM's analysis of potential impacts consists of a description of the potential effect, an analysis of the relevant facts, and application of the threshold criteria for significance to the facts. If mitigation is warranted, BLM provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. If necessary, BLM presents additional or alternative mitigation measures related to a potential impact and the required mitigation. Mitigation is designed to reduce the effects of potential direct, adverse project impacts.

Soil Resources

BLM evaluated the potential impacts to soil resources including the effects of construction and operation activities that could result in erosion and downstream transportation of soils and the potential contamination of soils and groundwater. There are extensive regulatory programs in effect that are designed to prevent or minimize these types of impacts. These programs are effective, and absent unusual circumstances, an applicant's ability to identify and implement BMPs to prevent erosion or contamination is sufficient to ensure that these direct, adverse impacts would not likely occur. In addition, soils would be protected by the development and implementation of grading plans and a DESCP.

Although these programs and BMPs are generally effective on most projects, the proposed project constitutes an unusual circumstance. The proposed project is of a very large scale compared to other projects constructed on active alluvial fans in the past. Although modeling and calculations can be used in an attempt to estimate future scenarios and provide a basis for structural design parameters, these methods are based on assumptions and projections that are imprecise and untested in this environment. Should these assumptions and calculations be inaccurate, direct, adverse consequences of flash flood damage or modified sedimentation and erosion rates could occur. Therefore, mitigation measures have been identified that would monitor these effects, and would require identification and implementation of other measures if adverse impacts occur.

Water Resources

BLM evaluated the potential of the project's proposed water use to cause a substantial depletion or degradation of groundwater resources, including beneficial uses. BLM considered compliance with the laws, regulations, and policies presented in **Table 4.10-6**. Compliance with these laws, regulations, and policies includes the Energy Commission's and State Water Resources Control Board's policy against using freshwater for power plant cooling unless other sources or other methods of cooling would be environmentally undesirable or economically unsound.

To evaluate if adverse impacts to soil or water resources would occur, the following criteria were used. Where a potential impact was identified, mitigation measures were identified to avoid or reduce the level of impacts.

- Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding or substantial erosion or siltation on or offsite?
- Would the project create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?
- Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?
- Would the project violate any water quality standards or waste discharge requirements?
- Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?
- Would the project contribute to any lowering of groundwater levels in the groundwater wells of other public or private water users?
- Would the project contribute to any lowering of the groundwater levels such that protected species or habitats are affected?

- Would the project cause substantial degradation to surface water or groundwater quality?

The direct and indirect impact and mitigation discussion presented below is divided into a discussion of impacts related to construction and a discussion of impacts related to operation. For each potential impact evaluation, the potential effect is described. Where adverse impacts have been identified, mitigation measures are discussed, including a discussion of the adequacy of the measures.

4.10.2.1 Proposed Project

Construction Impacts

Construction of the proposed project would include soil excavation, grading, installation of utility connections, and the use of groundwater. Groundwater use would primarily be for dust suppression and hydrostatic testing of the project's piping connections. Potential impacts to soils related to increased erosion or release of hazardous materials are possible during construction. Potential storm water impacts could result if increased runoff flow rates and volume discharge from the site were to increase flooding and sedimentation downstream. The Ivanpah playa could be impacted by the deposition or depravation of sediments. Water quality could be impacted by discharge of hazardous materials released during construction. Project water demand could affect the quantity of available groundwater. Potential construction related impacts to soil, storm water, and water quality or quantity, including mitigation measures, are discussed below.

Soil Erosion Potential by Water and Wind

Construction of each phase of the project is expected to take approximately 24 months to complete. The total earth movement would be substantial with approximately 135,000 cubic yards of soil to be cut, moved, and reused in a 170-acre area of Ivanpah 3 (CH2M Hill 2009a) and an additional 110,000 cubic yards of soil cut and moved throughout the remainder of the project. In total, approximately 245,000 cubic yards of soil would be cut and moved and an additional 412,600 cubic yards of vegetation would be cut and mulched (CH2M Hill 2007; CH2M Hill 2009a). The mulched vegetation would be reused for erosion control. The earth and vegetation work would primarily be for construction of the powerblock, underground utilities, and roadways, with additional vegetation cutting in areas to be occupied by heliostats.

These construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and ephemeral water dependant habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment deposition downstream. To minimize the effects of construction to the soil, the applicant has proposed the use of construction vehicles designed to minimize their impact to the soil. Most of the proposed vehicles are heavy and low impact tires or tracks have been proposed to be used to minimize compaction of the soil that could be caused by these vehicles.

The magnitude, extent, and duration of those impacts depends on several factors, including the exposure of the soils to water and wind, the soil types affected, and the method, duration, and time of year of construction activities. Prolonged periods of precipitation or high intensity and short duration runoff events coupled with earth disturbance activities can result in accelerated onsite erosion. In addition, high winds during grading and excavation activities can result in wind borne erosion leading to increased particulate emissions that adversely impact air quality. The implementation of appropriate erosion control measures would help conserve soil resources, protect downstream properties and resources, and protect air quality. Mitigation measures identified in Section 4.1 would prevent impacts from fugitive dust and soil erosion. Mitigation measures **AQ-SC3** and **AQ-SC7** would limit vehicle speed to 10 miles per hour during project construction and require all unpaved roads and disturbed areas in the project and linear construction sites to be watered as frequently as necessary during grading and stabilized thereafter with a nontoxic soil stabilizer or soil weighting agent to comply with the dust mitigation objectives of mitigation measure **AQ-SC4**. Mitigation measure **AQ-SC4** establishes performance standards for controlling fugitive dust and requirements for response should they be exceeded. The requirement to use soil weighting and bonding agents following grading would conserve freshwater by reducing the need for water as a means to control fugitive dust.

Soil losses would develop during construction and there would be ongoing soil loss after construction of the project. The linear utilities would result in soil disturbance by vehicles and other equipment during installation. Use of construction BMPs in these areas is expected to control soil loss during construction and to mitigate potential impacts to air and downstream properties and resources. Soil erosion and loss of soil due to project activities could be substantial and would need to be mitigated. The proposed erosion and sedimentation control measures include: preserving the existing vegetation to the extent possible; wetting or using soil binders or weighting agents active construction and laydown areas; controlling speed on unpaved surfaces; placing gravel in entrance ways; and use of straw bales, silt fences, and earthen berms to control runoff (CH2M Hill 2007; CH2M Hill 2009p; CH2M Hill 2009j). The development and implementation of a DESCP in accordance with mitigation measure **Soil&Water-1** would ensure adequate BMPs are in place to mitigate potential erosion and loss of soil. In addition, mitigation measure **Soil&Water-2** would require the project owner to develop and implement a construction SWPPP and comply with the dredge and fill requirements in **Appendix B – Soil and Water, Parts B, C, and D**.

Project Water Supply

Potable water for the construction workforce would be supplied by construction contractors from an offsite source (CH2M Hill 2007). Portable facilities would be used for sanitary needs and would operate without water. Construction water would be supplied by groundwater wells that would be drilled and constructed on site. The depth to groundwater at the project site is estimated to be between 215 to 715 feet bgs. Groundwater would not be encountered during grading activity. Mitigation measure **Soil&Water-3** would ensure that onsite groundwater wells would be constructed in accordance with state and local laws and regulations.

The applicant estimates that daily water demand during construction would average 99,333 gpd for Ivanpah 1 and 2 and 194,000 gpd for Ivanpah 3 with up to an additional 47,000 gallons used during pipeline hydrostatic testing (CH2M Hill 2007). The maximum water use for both construction and project operation would be 100 AFY. Mitigation measure **Soil&Water-4** would limit construction water use to 100 AFY, which is the proposed maximum water use for the project. This would ensure the applicant's proposed water use is consistent with the volume of water use analyzed in the Operation Impacts subsection below.

Wastewater

Improper handling or containment of construction wastewater could cause a broad dispersion of contaminants to soil or groundwater. Discharge of any non-hazardous construction-generated wastewater would require compliance with discharge regulations. Sources of wastewater would include equipment wash water and piping and vessel hydrostatic test water. Equipment wash water would be transported to an appropriate treatment facility. Hydrostatic test water would be reused to the extent possible and, pending analytical results of the water, would be discharged to land or trucked offsite to an appropriate treatment and disposal facility in accordance with the SWRCB Water Quality Order No. 2003-003-DWQ as a discharge to land with a low threat to groundwater and the requirements specified in **Appendix B – Soil and Water, Parts B, C, and D**. Disposal requirements for the hydrostatic test water are still under review by the RWQCB. With the use of BMPs and compliance with applicable laws and regulations, there would be no direct, adverse impact from construction-generated wastewater.

Operations Impacts

Operation of the proposed project could lead to accelerated soil erosion and increased storm water runoff. The project's operation could also lead to potential water quality and water supply impacts. Soils may be potentially impacted through erosion or the release of hazardous materials used in the operation of the proposed project. Storm water runoff from the project could result in potential impacts if increased runoff flow rates and volumes discharged from the project increase erosion of the soil and increase downstream flooding. Water quality could be impacted by discharge of eroded sediments from the project or discharge of hazardous materials released during operation. Water supply used for plant processes, heliostat mirror washing, and fire protection could lead to potential quantity or quality impacts to Ivanpah Valley groundwater resources. Potential impacts to water quality and water supply and the potential acceleration of soil erosion and increased storm water runoff related to the operation of the project, including required mitigation measures, are discussed below.

Soil Erosion and Storm Water Control

The proposed project would be located on an undeveloped alluvial fan. The storm water runoff either percolates into the soil of the alluvial fan or is conveyed through the alluvial fan wash channels or as sheet flow across the fan. Several project features would contribute to the potential for increased water erosion, including earth displacement, the long duration for construction, and changes to the properties of the soil. Construction of the proposed project would change natural drainages, remove natural vegetation and soil structure, and add impervious areas to the site, could cause an increase in storm water runoff.

Four different storm water control designs have been proposed by the applicant, each assuming a 24-hour, 100-year storm event. The first design proposed protecting the power blocks only with downgradient infiltration/evaporation basins. Under this design, all storm water flow on the upgradient side of the power blocks would be diverted around the power blocks to very large infiltration/evaporation basins on the downgradient side of the power blocks. This is a traditional design, suitable for most smaller projects. However, the proposed project would not have protected the heliostats during large storm events and may not have protected the power blocks during such large storm events. In addition, this design did not adequately address potential downstream impacts including natural sediment and surface water flows that maintain the Ivanpah playa.

The second and third designs proposed to capture and control all storm water that would enter the project on the upgradient side of the power blocks and heliostat fields. These designs would have involved the construction of very large storm water retention basins on the upgradient side of the Ivanpah 1, 2, and 3. The second design would have performed a dual function of releasing some storm water as sheet flow over the site, and diverting the remainder in channels around the site. The third design would have captured and released all storm water as sheet flow, with no diversion system. However, as BLM evaluated the specific details and potential impacts of these designs, the applicant proposed a complete re-evaluation of the design concept, and ultimately proposed a LID design. This fourth design involved minimizing storm water control and preserving the naturally developed storm water system to the extent practicable.

Under the fourth and final design, the principles of LID would be used to maintain natural drainage features and patterns to the extent feasible. Storm water and sediment flow would be managed in accordance with project-specific grading and drainage plans that were developed consistent with San Bernardino County, FEMA, and Clark County guidelines. The power blocks would be protected from storm water flows by embankments, fill, and drainage channels that would divert flow around the power blocks (WYA 2009b). The plans and guidelines would establish methods of when and how to control and manage storm water flow as it reaches, flows across, and then leaves the proposed project.

To support the final design parameters, the applicant conducted an onsite investigation of the hydrology of the project area and computer modeling of the storm flows and sedimentation rates. The potential storm water capture area for the project was determined by the applicant to be 21 square miles for Ivanpah 1, 6 square miles for Ivanpah 2, and 12 square miles for Ivanpah 3 (CH2M Hill 2007). Runoff from these sub-watersheds was modeled by the applicant using the HEC-1 computer model developed by the Army Corps of Engineers (USACE 2009). Storm water flow across the alluvial fan was modeled using the Flo-2D computer model developed for FEMA (FEMA 2009). Peak flows from these sub-watersheds was determined to range from 544 cubic feet per second (cfs) to 4,290 cfs. Flow velocities under the existing site conditions were found to be generally 3.5 feet per second (fps) or less. As might be expected, higher velocities were found to occur within the wash channels. Through the modeling, it was found that the flow velocities reduced as the flows translated into sheet flow or split into multiple channels on the alluvial fan (WYA 2009c). Based on this analysis, the majority of storm water flow was found to occur in Ivanpah 1 and 3.

Storm water flow volume and velocity is affected by the surface infiltration rate and the roughness of the flow surface. Construction, operation, and decommissioning of the proposed project may modify the infiltration rate through several processes, including earthmoving, compaction, and use of dust suppressants. Although field vehicles modified with low impact tires or tracks have been proposed, it appears likely that even with the low impact tires or tracks, roads would develop over the life of the project that would affect storm water flow and its erosive capability. Mirror washing cycles would take two weeks to complete. An estimated mirror breakage rate of 0.1 mirrors per year is stated in the AFC, but it is likely much more (possibly in the thousands without mitigation and up to 50 with mitigation). The AFC states that broken mirrors would be replaced annually by one repair truck. However, the mirror repair activity would likely require several trucks. The AFC states that other repairs and security checks would be performed daily by one truck.

While the project is designed to minimize disturbance of vegetation during construction and operations, long-term response of vegetation to the site development is difficult to predict. Precipitation patterns would be modified and mirror wash water would change the soil water content and other characteristics. Mirrors would cover a large proportion of the land surface and, during precipitation events, would be placed in the flat horizontal position. Precipitation would run directly off the mirrors, and therefore, would not increase or substantially reduce the overall volume of precipitation reaching the ground surface. However, the precipitation runoff would concentrate at the edges of the mirrors, rather than being dispersed throughout the area. Likewise, the mirror wash water would likely concentrate along the drip line below the heliostats, cause minor erosion of the soil at the drip line, and promote non-native plant growth such as weeds. The applicant estimated that the physical and chemical makeup of the wash water would lead to only minor buildups of CaCO3, copper, iron, and silica over the 50-year life of the project and that no wash water would flow offsite. The combination of these effects would not likely result in direct, adverse impacts to modification of local hydrology when compared to the volume and velocity of storm water that flows from the Clark Mountains and onto the proposed project site.

Other long-term effects on vegetation would include soil compaction, shading of the sun beneath the heliostats, and changes to the soil structure by use of dust suppressants. Evaluation of the long-term impact of project development on vegetation is included within the Compliance Monitoring and Closure Plan. In general, any reduction in the amount of vegetation would tend to increase storm water runoff volumes, runoff velocities, and erosion rates. **Table 4.10-8** presented below summarizes the difference between pre-construction and post-construction for storm water runoff and peak discharge during a 100-year storm event as modeled by the applicant (WYA 2009b).

Table 4.10-8
Change in Storm Water Runoff and Peak Flow Volume Between Pre- and Post-Construction for a 100-Year Storm Event

Scenario	Runoff Volume (acre-feet)	Peak Discharge (cfs)
Pre-Construction	1,712	5,806
Post-Construction	1,722	5,817
Numerical Change	(1.68%)	(4.48%)

Source: WYA 2009b.

As shown in the table above, the overall average change between the pre and post-project conditions in peak storm water flow was estimated by the applicant to increase 4.48 percent and the change in runoff volume was estimated to increase 1.68 percent. The greatest change modeled by the applicant occurred in the administration area where extensive grading and compaction would be required, and where Ivanpah 3 adjoins Ivanpah 2 (WYA 2009b). The overall change in storm water runoff and peak flow volume for a 100-year storm event would not likely result in direct, adverse impacts. The change in volume and peak flow is a small percentage of the total storm water flow.

Water quality could also be impacted if the storm water drainage pattern concentrates runoff in areas that are not properly protected with BMPs and cause increased erosion and sediment discharge offsite and possibly into the Ivanpah playa. Conversely, if the storm water controls are too restrictive, there could be a reduction in the sediment supplied to the west side of the Ivanpah playa adjacent to Interstate 15. The applicant's analysis of the project's impact on sedimentation rates to the playa concluded that there would essentially be no net change in sediment transport and deposition due to construction of the proposed project (CH2M Hill 2009a).

The assumptions used in the applicant's modeling were reviewed by BLM and modified in additional model runs performed by BLM (AECOM 2009). To ensure that the modeling and calculations evaluated worst-case impacts associated with increased storm water flow volumes and velocities, conservative assumptions regarding soil infiltration rates and roughness characteristics were made in the calculations. These included assumptions of extensive compaction associated with construction and complete denudation of vegetation due to shading and modified hydrology.

BLM's results are presented below in **Tables 4.10-9** and **4.10-10**. This analysis confirmed the applicant's conclusions regarding limited modification to storm water flow volumes, velocities, and downstream sedimentation rates. For a relatively frequent 10-year storm event, the total volume of storm water runoff would increase by about 1 percent with the peak discharge increasing approximately 3 percent due to construction and operation of the proposed project.

Table 4.10-9
10 Year, 24-Hour Storm Event

Site Condition	Runoff Volume (acre-feet)	Peak Flow (cfs)	Maximum Velocity (feet per second)		Ivanpah 1 and 2 Potential Number of Heliostats Failing	Ivanpah 3 Potential Number of Heliostats Failing
			Flood Plain	Ephemeral Channel		
Pre-Construction	1,962	8,653	4.7	13.9		
Post-Construction	1,973	8,924	4.9	16.5	1,808	2,306
Numerical Difference	11 (1%)	271 (3%)	2 (4%)	11 (16%)		

Source: AECOM 2009.
Note: The 10-year storm event was not modeled by the applicant.

The results from the 100-year storm analysis are similar. This relatively minor increase in runoff volume can be attributed to the high volume of storm water that would be entering the project from the large catchment basins in the Clark Mountains. The volume of storm water runoff that would be generated at the project site is relatively small compared to the volume of storm water entering the site.

BLM's analysis also confirms the applicant's conclusion that there would be no net sediment loss or gain. There would be no loss because the project design is intended to allow sediment to pass through the site in an uninterrupted manner, and would not include the construction of basins that would capture sediment. There would be no net sediment gain for two reasons: 1) the increase in storm water velocity on the proposed project site would not result in direct, adverse impacts; and 2) the storm water entering the site from upstream areas is already saturated with sediment and has no ability to acquire more sediment. There would be no change in sedimentation or erosion downstream of the project site because the storm water flow volume and velocity leaving the site is not significantly changed.

Table 4.10-10
100 Year, 24-Hour Storm Event

Site Condition	Runoff Volume (acre-feet)	Peak Flow (cfs)	Maximum Velocity (feet per second)		Ivanpah 1 and 2 Potential Number of Heliostats Failing	Ivanpah 3 Potential Number of Heliostats Failing
			Flood Plain	Ephemeral Channel		
Pre-Construction	4,242	18,939	7	14		
Post-Construction	4,637	19,204	9	25	13,889	18,172
Numerical Difference	395 (8.5%)	265 (1.4%)	2 (22%)	11 (44%)		
Post-Construction - Applicant Most Likely Case	---	---	5.9	26.6	3,934	4,260
Post-Construction - Applicant Worst Case	---	---	8.0	25.5	10,250	10,250

Source: AECOM 2009

In addition to development-related modification of storm water volumes, storm water velocities, and sedimentation rates, both the applicant and BLM calculated the potential impact of storm water-related scour on constructed facilities, including the heliostat fields. The heliostat fields include a total of 428,000 mirrors mounted on 214,000 individual 6-inch diameter poles. Using the concept of low impact development, there would be no storm water diversion or detention systems to divert storm water away from the heliostat fields or to reduce the velocity of storm water as it enters the fields. Because the heliostats would be mounted on poles, which would be driven into unconsolidated sediments on the alluvial fan, general erosion, migration of channels, and local scour caused by storm water flows could remove sediment supporting individual poles and cause them to fall to the ground. Once on the ground during a storm event, the broken glass associated with the mirrors could further break and be transported downstream. Also, the heliostat structure itself and the associated wiring, could be transported downstream. Although the security fence located on the downstream side of the proposed project area could stop larger pieces from leaving the property, it would not stop small glass fragments. Also, the fence itself could be threatened by storm water flows and could not guarantee the onsite capture of all damaged materials.

To evaluate the potential for heliostat failure and downstream transport, BLM conducted a local scour analysis of the potential impact of storm water velocities on individual heliostats (AECOM 2009). The analysis predicted that the scour from a 10-year storm could lead to the failure of more than 4,000 heliostats and more than 32,000 from a 100-year storm. The applicant has not conducted a direct calculation of the number of at-risk heliostats. However, BLM has estimated the number of at-risk heliostats based on the applicant's calculated storm water velocities, and the number could be more than 20,000 in a 100-year storm.

Up to six to nine feet of scour can occur at the project site. To test the potential effects of storm water flows and scour on the heliostats the applicant recently (August 2009) attempted to install and conduct load tests on heliostat poles. During this test, problems occurred where large rocks were encountered causing installation refusal and drilling equipment breakage and malfunction. The testing did not demonstrate poles could be installed at depths satisfactory to mitigate potential scour and failure. Satisfactory completion of heliostat pole installation testing by the applicant is necessary so BLM can confirm the proposed method of installation is adequate to install the heliostats at a depth sufficient to mitigate failure and that there would be no impacts related to other methods of installation. Mitigation measure **Soil&Water-5** requires the applicant to perform modeling and estimate scour depths in order to ensure that heliostats are installed to a depth sufficient to avoid or reduce instabiliuty. In addition, this measure requires the applicant to develop a Stormwater Damage Monitoring and Response Plan, which would include a plan to cleanup and mitigate failed heliostats. By requiring reinforcements of the heliostats, the estimated number of heliostat failures during a 10-year storm event would be reduced to approximately 10. During a 100-year event, this number would be reduced to approximately 50.

Provided the proposed method of installation is adequate to install poles at a depth sufficient to mitigate failure, the effects of erosion and storm water flow onto and off the proposed project can be mitigated through implementation of mitigation measures **Soil&Water-1**, **-2**, and **-5**. **Soil&Water-1** would require the project applicant to develop a DESCP to ensure protection of water quality and soil resources. **Soil&Water-2** would require the applicant to develop an Industrial SWPPP that meets the requirements specified in **Appendix B – Soil and Water, Parts B, C, and D**. Mitigation measure **Soil&Water-5** would require the applicant to develop a Storm Water Damage Monitoring and Response Plan to monitor the heliostats and mitigate potential impacts from heliostats damaged during storm events. In addition, as discussed in Section 4.19, mitigation measure **Soil&Water-5** would require the project owner to establish a baseline and monitor for any changes in the surface texture and quality of the Ivanpah playa, Changes that could occur to the playa surface include a change in sedimentation or the introduction of man-made elements such as broken heliostat mirror shards.

Project Water Supply

The applicant has proposed to pump groundwater from one of two onsite wells for all potable water and plant operation needs. BLM has analyzed the project's proposed groundwater use to determine if it would cause substantial depletion or degradation of local or regional groundwater quality and supply. As discussed previously, the applicant doubled the proposed number of mirrors on each heliostat and changed the mirror array fields from what was originally proposed in the AFC. Although this change increased the total surface area of all the mirrors combined by approximately 61.4 percent, the applicant has stated that the project's water demand would not exceed 100 AFY (CH2M Hill 2008d). The applicant has also stated during workshops that they would like to have the water supply metered on a five-year rolling average. Such an average is too uncertain in an environment where water supply is quite limited and when project engineers can reasonably estimate the volume of water that would be required for the project's construction and operation. Computer modeling by the applicant of the potential impacts associated with the use of groundwater was based on an annual maximum extraction and use of 100 AFY.

Regional Groundwater Supply

In desert regions, estimation of groundwater recharge from precipitation is the controlling factor in estimating the balance of groundwater available for development in a given basin without causing direct impacts. **Table 4.10-11** presents a summary by various researchers of estimates of precipitation-derived recharge in the Ivanpah Valley. The estimates of recharge vary due to differences in the area calculated within which precipitation would occur and differences in calculations of how much precipitation translates into groundwater recharge.

Table 4.10-11
Groundwater Recharge Estimates

Researcher and Year	Estimated Groundwater Recharge (AFY)
Glancy 1968	1,607
Moore 1968	1,275
Geomega 2000	2,845
Donovan and Katzer 2000	5,800
ENSR 2008	2,806
Applicant CH2M Hill 2007	6,200
Energy Commission Staff 2009	5,223 to 6,538

Sources: CH2M Hill 2007; Donvovan/Katzer 2000; ENSR 2008; Glancy 1968.

The recharge estimates by Glancy were among the first detailed estimates made for the Ivanpah basin. These estimates were made using the Maxey-Eakin method; however, the data from which the estimates were made contained inaccuracies. Precipitation estimates were made using a generalized statewide precipitation map of Nevada made in 1965, and the areal extent of the watershed boundary was underestimated by tens of thousands of acres. The recharge estimates by Moore and Geomega were based on estimations of the relationship between precipitation, altitude, runoff, and recharge that provides only a rough approximation of recharge.

The estimates made by Donovan/Katzer were made using a modified Maxey-Eakin method and appear reasonable. The watershed boundary matches that developed by the applicant and closely matches the watershed boundary estimated by BLM.

The ENSR recharge calculations differ from those made by Donovan/Katzer's and the applicant because Glancy's estimated watershed areal extent was used, as was the standard Maxey-Eakin altitude limit of 5,000 feet above mean sea level (amsl), for when precipitation begins to contributes to recharge. For these reasons, the ENSR calculations underestimated recharge.

Both the applicant and Donovan/Katzer used a precipitation limit of 4,500 feet amsl. The applicant's watershed estimates were based on recent United States Geological Survey digital elevation maps, a more accurate way to define and measure the area of the watershed.

Estimates of recharge were independently conducted by BLM. Precipitation data was obtained from the U.S. Department of Agriculture (USDA) Geospatial Data Gateway, PRISM Group (Oregon State University). Watershed and subwatershed data was obtained from the USDA Geospatial Data Gateway: 12 digit hydrologic unit. This digitized information was imported into the Energy Commission's GIS to calculate standard Maxey-Eakin method estimates of recharge. Because the Maxey-Eakin method applies a recharge efficiency factor for a given category of precipitation (i.e., a precipitation range with an upper and lower limit), BLM used these upper and lower precipitation limits to develop a range of potential recharge. BLM estimated this recharge to be between 5,223 to 6,538 AFY. This range encompasses those of Donovan/Katzer and the applicant.

Prior to development of water resources in the IVGB, a state of equilibrium was achieved in which the basin inflows (recharge from precipitation) equaled the outflows. Glancy indicates that, since groundwater levels are relatively deep in the IVGB, there is likely very little discharge or outflow due to evapotranspiration. Glancy also shows there are changes in groundwater levels between Ivanpah and Las Vegas Valley, and concludes that the predominant direction of flow is to the north from IVGB across a gap or boundary at the north end of Ivanpah Valley. Given the absence of evapotranspiration, and groundwater flow conditions between valleys, it appears the primary mechanism for outflow from IVGB is underflow to the north. These basin conditions suggest that since pre-historic time the IVGB has filled and water levels have increased to an elevation where underflow into the Las Vegas Valley has been established at a relatively steady rate. This rate of underflow can be considered to be in balance with the long-term volume of precipitation that becomes groundwater recharge in the IVGB. It can therefore be assumed that since the underflow constitutes all outflow, the inflow equals the outflow in the IVGB during prehistoric or pre-development conditions. Groundwater basin model simulations by ENSR (2007) also show that the effects on underflow due to current pumping in the basin would be minimal over a 200 year time period. This suggests that even with current and future project pumping the underflow can be assumed to be the same because the pumping is insignificant with respect to the time frame for response of the groundwater basin.

Using these relationships between inflow and outflow from the IVGB and BLM's estimate of recharge in **Table 4.10-11**, BLM developed the annual water balance for the IVGB shown below in **Table 4.10-12**. This water balance shows the annual sum of gains and losses within the groundwater basin based on pre-developed conditions, current pumping, and proposed future pumping in the IVGB based on no change in underflow.

Table 4.10-12
Ivanpah Valley Groundwater Basin Balance

Basin Inflows and Outflows	Pre-Development Basin Balance	Post Development Basin Balance	
		Existing Conditions	Estimated Future Conditions
Inflows (AFY)			
Recharge from Precipitation[1]	5,223 to 6,538	5,223 to 6,538	5,223 to 6,538
Underflow and Surface Water	0	0	0
Total Inflow	5,223 to 6,538	5,223 to 6,538	5,223 to 6,538
Outflows (AFY)			
Groundwater Pumping[2]			
Reoperation of the MolyCorp Mine	0	0	1,200[3]
ISEGS Proposed Project[4]	0	0	100
FirstSolar Photovoltaic Power Plant[4]	0	0	30
Ivanpah Energy Center	0	0	15
Primm Outlet Mall New Fast-Food Restaurant	0	0	15
NextLight Silver State North and South Photovoltaic Power Project	0	0	14
Interstate 15 Improvements	0	0	10
Southern Nevada Supplemental Airport[5]	0	0	0
DesertXpress Rail Line	0	0	0
Temporary Caltrans Batch Plant	0	0	0
Mixed-Use Development (near Jean)	0	0	0
Las Vegas Valley Water District Pipeline	0	0	0
SCE Transmission Line Upgrades	0	0	0
Wind Energy Projects – Clipper Wind and PPM Wind	0	0	0
Primm Valley GolfClub[6]	0	1,741	1,741
Primm Municipal & Casinos[7]	0	1,470	1,470
Other Mining	0	1,060	1,060
Community of Jean & Jean Lake Valley	0	740	740
Industrial Water Use	0	150	150
Community of Goodsprings	0	120	120
Community of Desert	0	50	50
Domestic Water Use	0	40	40
Community of Nipton	0	30	30
Community of Calnerva	0	1	1
Total Groundwater Pumping	*0*	*4,727*	*5,986*
Water-Use Returns[6]	0	-993	-993
Total Outflow	0	3,744	5,128
Basin Balance (AFY)	**5,223 to 6,538**	**1,479 to 2,794**	**94 to 1,410**

Source: CH2M Hill 2007; CH2M Hill 2009j

Notes:

1. Recharge from precipitation is reported as a range developed by the Energy Commission staff based on variability in elevation and precipitation rates.
2. All pumping volumes are from the AFC, except the pumping volume for the Primm Valley Golf Club. The pumping volumes in the AFC were based on the 2007 ENSR report (ENSR 2007).
3. BLM supplied estimated of future pumping.
4. Assumes maximum estimated groundwater use.
5. The water supply for the proposed airport would be pumped in from the Las Vegas Valley. Return flow from this water supply is not included in the water budget, because it cannot be quantified at this time. However, this return flow could be significant.

6. Pumping data from the May 2009 Ground-Water Monitoring Ten-Year Report for the Primm Valley Golf Club.

7. Recharge from Primm municipal and casinos was calculated assuming an average 500,000 gpd (560 AF/y) return flow, an average consumption of 30,000 gpd (33.6 AF/y) by the Bighorn Power Plant, and evaporative loss of 3.5 AF/y. This return flow minus the consumptive use and evaporative loss would leave 523 AF/y, of which 90 percent (471 AF/y) is the maximum amount that can be credited as return flow recharge in accordance with permits issued by the state of Nevada.

8. ENSR (2008) assumed a 30 percent return flow from the Primm Valley Golf Club and 40 percent return flow from municipal gray water infiltration. All water use return from potential future facilities were excluded, which would total 293 AF/y at a 30 percent return flow for all domestic and community groundwater use.

BLM estimates in **Table 4-10.12** show that groundwater recharge or inflow exceeds both the current and future pumping rates in the basin. They also show that even with current pumping, project pumping, and foreseeable future project pumping, there is still a net gain in recharge to the IVGB.

Although a net gain in recharge can be shown, BLM also notes there are areas in the IVGB where substantial declines in groundwater levels have been observed. The declines occur in areas where current and past pumping wells have been located in the basin consisting of primarily wells used for irrigation of the Primm Valley Golf Course and the Primm municipal and casino wells. Monitoring of the declines is currently required by the County of San Bernardino because of concern for potential basin impacts.

These declines and resulting basin storage losses can be expected given the relatively slow response time for the basin suggested in the ENSR (2007) 200 year model simulations. The magnitude of historical storage losses can be estimated by evaluating the areal extent of groundwater level declines, of up to 40 feet, that have been observed in the basin since 1953 (CH2M Hill 2007). To evaluate the declines, the applicant spatially averaged the extent and magnitude of the declines and used an assumed specific yield for the aquifer to estimate the change in basin storage for the 53-year period of record (1953 to 2005). Using this method they estimated a reduction in basin storage of 1,300 AFY (CH2M Hill 2007).

This reduction in basin storage and water levels could translate into basin-wide impacts. As water levels equilibrate and stabilize based on current and future pumping over time the local declines would spread and result in lowering of basin-wide water levels. In the case of IVGB, this equilibration time is largely a function of the time and duration of pumping, areal extent of the basin, aquifer characteristics, and nature of the boundary where underflow occurs. The quantification of basin wide water level declines that would occur is currently difficult to predict, because little is known about the boundary where underflow occurs. Although the magnitude of long-term potential declines cannot be predicted, the nature of the aquifer characteristics and recent studies suggest the time for basin wide water levels to decline substantially could take centuries and potential impacts during the life of the project and reasonably foreseeable projects would not be likely to occur.

BLM also evaluated potential impacts to the Las Vegas Valley basin, which likely receives a component of inflow from the IVGB. The The 200-year groundwater model simulations by ENSR (2007) showed the underflow to the Las Vegas Valley would only be reduced by 8 percent over the next 200-years based on current pumping. Project pumping and reasonably foreseeable project pumping would increase the total basin pumping by 11 percent. This is a minimal increase and would not substantially change the reduction in flow to Las Vegas Valley. The project and cumulative pumping from existing and proposed projects would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge. Further analysis of potential impacts from water level declines and local drawdown are discussed below.

Local Groundwater Supply

Analysis of potential changes in groundwater levels from project pumping was necessary in order to evaluate whether there would be any impacts to other groundwater wells. Drawdown or a decrease in groundwater levels due to groundwater pumping can result in adverse impacts when the pumping results in lower groundwater levels in nearby wells. These impacts can be both short- and long-term. Interference or drawdown can result in increased pumping lifts and declines in well productivity. Mitigation of these impacts could require costly modifications including the cost of lowering pumps, the cost of deepening a well, and well redevelopment costs. Substantial increases in pumping lift can also cause substantial increases in energy costs.

The magnitude of groundwater drawdown impact is controlled by five factors: (1) the rate of pumping; (2) the duration of pumping; (3) the depth of the well screens (water-intake depth of well); (4) aquifer parameters; and (5) aquifer boundary conditions. Aquifer parameters, such as specific yield and hydraulic conductivity, are controlled by layering and thickness of the water bearing materials such as gravel, sand, silt, and clay. The composition and flow characteristics of an aquifer can vary widely.

To accurately determine the impact of pumping specific to the project, calculations of drawdown must be based on the aquifer conditions within the vicinity of the pumping wells. The applicant developed a two-dimensional groundwater-flow model that uses local aquifer conditions and the expected well construction configuration to evaluate the potential project-related pumping and recharge impacts. A summary of the parameters used in the model are presented below in **Table 4.10-13**.

Table 4.10-13
Groundwater Model Parameters and Corresponding Values

Parameter	Value
Horizontal Hydraulic Conductivity	2 feet per day
Vertical Hydraulic Conductivity	0.2 feet per day
Specific Storage	0.00001
Specific Yield	0.05
Aquifer Thickness	1,000 feet
Transmissivity	15,000 gallons per day per foot
Depth to Screen Top	300 feet
Depth to Screen Bottom	400 feet
Pumping Rate	100 AF per year

Source: CH2M Hill 2007.

Based on the results of this groundwater modeling, the project's groundwater pumping is expected to cause local groundwater levels to decline over the project's 50-year life

(CH2M Hill 2008d). The expected groundwater level declines due to the project's pumping are:

- 2.1 feet at 0.5 mile from the project pumping well;
- 1.4 feet at 1 mile from the project pumping well; and
- 0.8 feet at 2 miles from the project pumping well.

The nearest groundwater wells are the Colosseum wells (Nos. 1 and 2) used for the Primm Valley Golf Club, approximately one mile northeast of the proposed project wells (CH2M Hill 2008d). A summary of the well construction details for these wells is presented below in **Table 4.10-14.** These wells penetrate primarily sands and gravels to a depth of 566 to 693 feet below ground surface. The wells are screened beginning at about 290 to 350 feet bgs and extend to roughly the total well depth. Groundwater levels in these wells occur at approximately 2,500 feet amsl (Broadbent 2009). The applicant's modeling results show that the groundwater levels in the Colosseum wells would decline by less than 2 feet over the 50-year life of the project (CH2M Hill 2007). This magnitude of drawdown is much less than the monthly and annual fluctuations in water levels due to pumping of the Primm Valley golf course wells. The limited amount of drawdown over the life of the project, <0.04 feet/year, would not have a measurable impact on the yield of the Colosseum wells.

BLM notes that at Colosseum Well #1, water level measurements show the difference between the 10-year average groundwater elevation and the top of the screened interval in Colosseum well #1 is approximately 3.4 feet. Measurements in 2007/2008 suggest the groundwater level in Colosseum well #1 may be below the top of the well screen during some times of the year. Where drawdown lowers water levels below well screen elevations there is the potential for impacts due to incrustation and sedimentation of a well. Incrustation and sedimentation would result in increased maintenance costs and shortened life of the well and pump components. Because part of the well screen of Colosseum well #1 may already be exposed during current pumping, adverse impacts may already be occurring. The two-foot incremental drawdown from the project's proposed pumping over the 50-year life of the project would not likely contribute to potential impacts already occurring at the Colosseum well.

BLM also evaluated whether drawdown from project pumping would contribute to exceedance of the significance elevations established for golf course pumping. The significance criteria or 'significance elevations' for groundwater levels established by San Bernardino County (County) for the Colosseum wells are presented in **Table 4.10-14** (Broadbent 2009). These significance elevations were established as a basis for determining whether there would be any impacts from pumping the Colosseum wells. For the pumping in the Colosseum wells, an adverse impact occurs when groundwater levels in these wells reaches 2,487 and 2,493 feet amsl, respectively (Broadbent 2009). Average groundwater elevations in the Colosseum wells #1 and #2 have been 2,507 and 2,513 feet amsl and recent groundwater levels were 2,503 and 2,507 feet amsl during 2007/2008 (Broadbent 2009). Based on the 2007/2008 groundwater levels in the Colosseum wells, 16 feet of groundwater remained in Colosseum well #1 and 14 feet in well #2 before the threshold would be reached.

The estimated contribution of the project's proposed pumping over the 50-year life of the project to impacting operation of Colosseum Well# 1 and reaching or exceeding the 'significance elevations' is limited and should not contribute to direct, adverse impacts in the basin. BLM is concerned, however, that there may be substantial variability in the aquifer and the local drawdown estimated by the ENSR model may not be precise. To ensure there are no unanticipated changes in drawdown due to project pumping, the applicant should be required to develop a groundwater monitoring program similar to that required for the Colosseum wells used for the Primm Valley Golf Course. Mitigation measure **Soil&Water-6** would require the applicant to comply with the County of San Bernardino's Desert Groundwater Management Ordinance and implement a monitoring plan that would characterize baseline water levels in the project vicinity, characterize aquifer materials, integrate water level measurement with the existing monitoring network, and provide for analysis of the project effects on water levels in the area. BLM proposes to coordinate with the County of San Bernardino to evaluate golf course pumping impacts and the contribution of the proposed project pumping to determine what mitigation, if any, would be needed by the applicant.

Table 4.10-14
Well Construction Details

Well	Distance from the Proposed Project Wells (miles)	Total Well Depth (feet bgs)	Screen Interval (feet bgs)	Wellhead Elevation (feet amsl)	Groundwater Average Elevation (feet amsl)	Difference between average groundwater elevation and Top of Screen (feet)	Well Purpose
Colosseum #1	0.98	566	290556	2,793.60	2,507	3.4	Golf Course - Primary
Colosseum #2	0.82	693	350674	2,801.36	2,513	62	Golf Course - Primary
PVGC7	1.86	695	345685	2,689.08	2,515	171	Golf Course - Backup
PVGC8	1.91	695	345585	2,679.58	2,514	179	Golf Course - Backup
PVGC9	2.00	460	290450	2,670.98	2,514	133	Monitoring
Stateline	2.03	300	---	---	2,521	---	---
Yates	3.04	120	---	---	2,520	---	---
M-8	4.68	---	125230	---	---	---	Monitoring
M-13	1.13	750	530750	---	---	---	Monitoring
M-14	1.29	300	190300	---	---	---	Monitoring

Source: Broadbent 2009.

Other wells in the vicinity of the proposed project would not be impacted by the project's use of groundwater. To provide a baseline and document groundwater levels changes related to the project's proposed use of groundwater, mitigation measure **Soil&Water-6** would require the project to monitor and document groundwater levels to establish a groundwater level baseline and to monitor groundwater level changes over time in conjunction with the ongoing groundwater monitoring at the Primm Valley Golf Club.

To ensure the proposed project does not consume more than 100 AFY and is consistent with the volume analyzed, mitigation measure **Soil&Water-4** would limit the amount of groundwater the project could extract and use during operations to 100 AFY. Given the potential for shorter- or longer-term variability in the basin balance and localized drawdown impacts, the project should conduct groundwater monitoring in conjunction with the ongoing groundwater monitoring at the Primm Valley Golf Club, which monitors and reports the groundwater levels in the vicinity of the proposed project. As discussed above and below in the section on Groundwater Quality, mitigation measure **Soil&Water-6** would require the project to develop a groundwater level monitoring and reporting plan and integration with the Primm Valley Golf Course's existing groundwater monitoring and reporting program. The seeps and springs located in the Clark Mountain are ephemeral and located upgradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further upgradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. No adverse impact to the seeps or springs is expected.

Groundwater Quality

Water quality can be impacted by migration of low quality or contaminated water towards pumping wells and by sustained pumping of the groundwater basin. By providing a measure of water salinity, TDS is a primary indicator of the natural quality of groundwater and is a measure of acceptance for the use of groundwater as a drinking water source. Water with TDS concentrations greater than 2,000 mg/l is generally considered undrinkable. In California, the recommended Secondary MCL or 'Consumer Acceptance Contaminant Level' for TDS is 500 mg/l, and upper and short term ranges can be 1,000 and 1,500 mg/l, respectively. The TDS concentrations in the IVGB range from 300 to 27,501 mg/l (DWR 2003).

TDS at the project site is estimated to be 369 to 600 mg/l (Broadbent 2002). Past Molycorp Mining operations have resulted in elevated TDS, nitrate, strontium, barium, and radium levels in the groundwater at their discharge ponds in the Ivanpah lakebed (RWQCB 1998a). The old and new Molycorp evaporation ponds are between 4 and 6 miles from the proposed project site (CH2M Hill 2008g). Based on TDS measurements, Broadbent in 2002 found that pumping in the wells used for the Primm Golf Course might induce the lower quality groundwater from the playa to move towards the pumping wells near the Ivanpah playa. In addition, sustained overdraft of a groundwater basin can lead to water quality impacts. This can occur due to encroachment of pumping on lower saline portions of an aquifer. Substantial declines in water level of an unconfined aquifer can also induce flow from low quality perched groundwater zones or flows from more saline portions of the aquifer such as from beneath the Ivanpah playa.

The applicant conducted groundwater modeling analysis to determine if pumping from the project wells would affect the groundwater gradient and velocity at the old and new Molycorp evaporation ponds (CH2M Hill 2008g). The modeling estimated a project pumping induced groundwater gradient of less than 0.00003 feet per foot (ft/ft) and induced velocity of less than 0.1 feet per year (ft/yr) at the old and new evaporation ponds (CH2M Hill 2008g). The predicted changes to the groundwater gradient and velocity are negligible. Therefore, no direct, adverse impacts related to the Molycorp evaporation ponds are expected to occur to water quality or ongoing remediation efforts.

BLM understands that use of the wells at the Primm Valley Golf Club has been reduced due to intrusion of brackish water that was not suitable for landscape irrigation (Broadbent 2002). The cause of the intrusion was believed to be due to pumping induced migration of saltier groundwater underlying the playa to the east. Groundwater modeling conducted by the applicant indicates that the combined effects of the Primm Valley Golf Club pumping and pumping at the proposed project site would only result in local changes to groundwater levels and minor changes to groundwater quality (CH2M Hill 2009e). The parameters used in the model were the same as those presented in **Table 4.10-13** with the addition of 1,660 AFY of groundwater pumping at the Primm Valley Golf Club. A groundwater monitoring report for the Primm Valley Golf Club for the 10-year span of 1997 to 2007 indicates there have been no appreciable groundwater declines or increase in TDS as a result of increasing pumping at the Primm Valley Golf Club (Broadbent 2009).

The numerous ephemeral washes that provide drainage to the Clark Mountains that cross the proposed project site are considered surface water in the RWQCB's Basin Plan (RWQCB 2005). These washes provide beneficial functions and values for groundwater recharge, flood peak attenuation and floodwater storage, and wildlife habitat. Development of the project would impact the function and value of these washes as wildlife habitat. Other than wildlife habitat, all other beneficial uses of these washes would not be adversely impacted. The proposed project would be allowing nearly all of the storm water to flow through the site relatively unimpeded. Current modeling estimates that the proposed project would result in a change in peak flow of 1.4 percent and a change in runoff volume of 8.5 percent. Due to the volume of storm water flow onto the site from the Clark Mountains, changes to the soil that would occur due to compaction, removal of vegetation, and additions of impervious surface areas (increased runoff and decreased infiltration) would not adversely affect the volume or velocity of storm water runoff or rates of sedimentation.

As previously discussed, there would be no impacts to current groundwater users and that current and future pumping in the basin would not result in overdrafting of the groundwater basin such that the beneficial uses would be impacted. The quality of the water would likely only be minimally impacted by the project and the maximum drawdown would be 2.1 feet at a half mile from the projects pumping and 0.8 feet at 2 miles from the projects pumping. The wells closest to the proposed project wells are located approximately one mile to the northeast. These well would experience a water level decline of less than 2 feet. Use of the groundwater would comply with applicable laws and regulations. Therefore, there would be no direct, adverse impact to any other beneficial use or users of the groundwater.

Wastewater

The applicant proposes two separate wastewater collection systems for the proposed project. The first system would collect all wastewater generated from operation of the plant equipment and recycle and reuse that water to the extent practicable (CH2M Hill 2007). A wastewater collection system would return water from all general plant drains back to the raw water storage tank. Water that may contain oil or grease would first be routed to an oil/water separator before going to the raw water storage tank. Mitigation measure **Soil&Water-7** would ensure that the collection and recycling of this wastewater would be managed in accordance with applicable BMP's and regulations.

The second system would collect and treat all sanitary wastewater from sinks, toilets, and other sanitary facilities. Because there are no sanitary sewer connections, the sanitary wastewater would be processed through a septic system and discharged to a leach field. Solids would be periodically removed by a professional service. The maximum average daily wastewater flow to the leach field is expected to be 700 gallons (CH2M Hill 2009e). No direct, adverse water or soil related impacts are expected to occur due to wastewater if the project owner complies with mitigation measures **Soil&Water-7** and **-8**. **Soil&Water-7** describes reuse and disposal requirements for wastewater and **Soil&Water-8** provides the requirements for the installation of the proposed septic tank and leach field.

Closure and Decommissioning Impacts

After the end of the project's useful life, it would be decommissioned as described in the applicant's Closure, Revegetation, and Rehabilitation Plan, Revision 3 (CH2M Hill 2010). The facility would be removed, original contours restored, and the site revegetated. However, the removal of the existing facility could cause substantial disturbance to soil and water resources. The project closure would require many of the same resource protection plans as required for construction, and thus, no direct, adverse impacts to soil and water resources would be anticipated.

Beneficial Impacts

The proposed project would not provide any beneficial impacts associated with soil and water resources. The recycling of process water would constitute a beneficial use of that water, as is encouraged through California state regulations and policies. However, this use would still ultimately be consumptive, and would not constitute an overall beneficial impact from the alternative.

4.10.2.2 Mitigated Ivanpah 3 Alternative

The environmental setting of the Mitigated Ivanpah 3 Alternative, with respect to soil and water resources, would be very similar to that of the proposed project. The project location would be almost identical with that for the proposed project, with the exception of the elimination of a 433-acre area in the northern portion of Ivanpah Unit 3. Therefore, the general environmental setting factors associated with the impacts to soil and water resources, including soil types, groundwater resources, other groundwater users in the region, and the position of the alternative with respect to surface water drainage features, would be almost the same for the proposed project and the Mitigated Ivanpah 3 Alternative. However, a key difference between the setting of the Mitigated Ivanpah 3 Alternative as compared to that of the proposed project would be elimination of the drainage features associated with the northern 433 acre portion of Ivanpah Unit 3.

As discussed above, the size and number of drainage channels associated with the proposed project is highest in Ivanpah Unit 3. Based on mapping performed by the applicant, as well as observations from site visits conducted by BLM and Energy Commission staff, the largest channels in Ivanpah Unit 3 are located in the northern third of the property, approximately coincident with the 433-acre portion eliminated from development in the Mitigated Ivanpah 3 Alternative. As a result, the potential impacts on the facility from stormwater flows, and the potential impacts of project development on downstream resources, would differ between the proposed project and the Mitigated Ivanpah 3 Alternative.

Construction Impacts

Potential construction-related impacts associated with the Mitigated Ivanpah 3 Alternative would include:

- Soil erosion from grading and earthwork;
- Impacts to drainages, including Waters of the State;
- Stormwater and flooding impacts to facility infrastructure;
- Modification of downstream sedimentation and erosion characteristics; and
- Impacts to groundwater availability or quality.

As discussed above, the applicant has proposed a Low Impact Development approach which would minimize the amount of necessary grading and site disturbance by allowing stormwater to flow through the facility on its natural drainages. In the proposed project, active stormwater protection, in the form of diversion channels and berms, would be developed only around the power block and substation areas, leaving stormwater to flow unimpeded through the heliostat areas. Grading would be limited to the power block and substation areas, and to areas of the heliostat fields where existing channels are large enough to require grading to provide site access and a relatively flat area for installation of heliostats. These areas of the heliostat fields requiring grading were mostly limited to the northern portion of Ivanpah Unit 3. Overall, the acreage requiring grading in the proposed project was estimated to be 170 acres.

In the Mitigated Ivanpah 3 Alternative, the northern portion of Ivanpah Unit 3, which is the area requiring the most extensive grading, would not be included within the project footprint. The acreage of grading required in the heliostat fields for the Mitigated Ivanpah 3 Alternative would be reduced from 170 to 20 acres, a reduction of approximately 88 percent. Therefore, with respect to potential soil erosion caused by grading, impacts associated with the Mitigated Ivanpah 3 Alternative are substantially lower than those for the proposed project.

The Mitigated Ivanpah 3 Alternative would also reduce the acreage of active drainage pathways, which are designated as Waters of the State, which would be affected by the proposed project. In the proposed project, a total of 198 acres of drainages are present, and the elimination of the northern portion of Ivanpah Unit 3 would reduce this acreage to 174 acres, a reduction of approximately 9 percent. By implementing the Low Impact Development construction approach, only a portion of these drainages would be affected by construction traffic and placement of heliostats, so the exact reduction in affected acreage that would be accomplished through the Mitigated Ivanpah 3

Alternative cannot be quantified. However, it can be assumed that the reduction of the affected acreage would be on the same scale as the reduction of the total acreage, or approximately 9 percent.

Potential impacts associated with stormwater damage to facility infrastructure and modification of downstream sedimentation and erosion characteristics would be the same for the construction, operations, and closure/decommissioning phases of both the proposed project and the Mitigated Ivanpah 3 Alternative. These impacts, and the relative comparisons between the proposed project and the Mitigated Ivanpah 3 Alternative, are addressed under operations impacts below.

The final issues associated with soil and water resources include potential impacts to groundwater resources, including the amount of groundwater available, as well as potential impacts to groundwater quality. The amount of water that would be used for any given period for construction of the proposed project would be the highest during construction of Ivanpah Unit 3, approximately 200 acre-feet per year, as compared to approximately 100 acre-feet per year for Ivanpah Units 1 and 2. The water volume required for Ivanpah Unit 3 would be higher due to the need for water to be used for dust control for the extensive grading needed in Ivanpah Unit 3. In the Mitigated Ivanpah 3 Alternative, the acreage of grading would be reduced from 170 acres to 20 acres. Therefore, the peak water usage period for construction of Ivanpah Unit 3 in the Mitigated Ivanpah 3 Alternative would be much shorter than that for the proposed project. Because the duration of water use for construction would be reduced for the Mitigated Ivanpah 3 Alternative, potential groundwater use conflicts would be lower than those for the proposed project.

Similarly, potential sources of groundwater contamination during construction would be the same for the proposed project and the Mitigated Ivanpah 3 Alternative. Because the duration of construction for the Mitigated Ivanpah 3 Alternative would be reduced from 48 months to 40 months, the risk of contamination occurring would be reduced from that of the proposed project.

The source of water for construction, operations, and closure/decommissioning of the Mitigated Ivanpah 3 Alternative would be slightly different from that in the proposed project. In the Mitigated Ivanpah 3 Alternative, the location of the water production wells would be approximately 2,400 feet northwest of their location in the proposed project. This location would be further from the wells operated by the Primm Valley Golf Course, and would therefore be less likely to affect those wells. Therefore, although the location of the water source would be slightly different in the Mitigated Ivanpah 3 Alternative, the change in the location of the water production wells would not affect overall groundwater availability.

Operations Impacts

For the proposed project, BLM and the Energy Commission evaluated the potential for stormwater flows from the mountains to the west of the project area to cause flooding or erosion damage to site infrastructure, including fences and heliostats. Both the applicant and BLM conducted stormwater modeling of the drainage basin, including active alluvial fan areas, to estimate to volume and velocity of stormwater flow to which the facility may be subjected during extreme precipitation events. Those calculations showed that stormwater-related scour could occur at the base of heliostats, and this erosion could potentially result in heliostats falling down and moving downstream during storm events. The concerns of BLM and the Energy Commission included the potential for stormwater damage to affect the financial viability of the ongoing operation of the facility, and the potential for these events to transport heliostat and mirror debris to areas downstream of the approved ROW grant. As a result, mitigation measures, in the form of a Storm Water Damage Monitoring and Response Plan, have been identified. The key components of this plan include:

- Installation of heliostats at a depth designed to withstand predicted levels of stormwater scour;
- Inspection of fences and heliostat fields following storm events to identify and correct damage; and
- Consideration of post-construction stormwater system design modifications, if needed to address ongoing issues.

All of these issues and concerns would remain for the Mitigated Ivanpah 3 Alternative, as for the proposed project. The location of the Mitigated Ivanpah 3 Alternative on the active alluvial fan would remain approximately the same, and the project would be constructed with the same Low Impact Development approach. However, the potential for impacts would be reduced from those of the proposed project because the northern portion of Ivanpah Unit 3, which is the area determined to present the largest potential stormwater damage risk, would be eliminated in the Mitigated Ivanpah 3 Alternative. Although the project acreage would be reduced by approximately 12.5 percent, the stormwater damage risk would be reduced by a larger amount because the 12.5 percent of the area eliminated would be the area that has the largest and most active drainages channels. The proposed Storm Water Damage Monitoring and Response Plan, applied to the Mitigated Ivanpah 3 Alternative in the same manner as the proposed project, would help to ensure that stormwater damage impacts do not occur, or are addressed and mitigated when they do occur.

Similar to the discussion of water use for construction, the only differences in water use between the Mitigated Ivanpah 3 Alternative and the proposed project would be a small change in the location of the water production wells, and a reduction in the amount of water needed to clean heliostats. As stated in the discussion of construction impacts above, the change in the location of the wells in the Mitigated Ivanpah 3 Alternative would not result in any change to potential water use impacts. By reducing the number of heliostats from 214,000 to 173,500 (a reduction of 19 percent), the amount of water used for heliostat washing would also be reduced by approximately 19 percent. Therefore, potential water use impacts associated with operation of the Mitigated Ivanpah 3 Alternative would be reduced by 19 percent.

Closure and Decommissioning Impacts

The soil and water impacts associated with closure and decommissioning of the Mitigated Ivanpah 3 Alternative would be similar to those described for construction above. Because decommissioning would include a smaller area, and have a shorter duration, the Mitigated Ivanpah 3 Alternative would have a reduced potential for water use, water quality, and soil erosion impacts than the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with soil and water resources. The recycling of process water would constitute a beneficial use of that water, as is encouraged through California state regulations and policies. However, this use would still ultimately be consumptive, and would not constitute an overall beneficial impact from the alternative.

4.10.2.3 Modified I-15 Alternative

The environmental setting of the Modified I-15 Alternative, with respect to soil and water resources, would be similar to, but not exactly the same as, that for the proposed project. The project location would be almost identical with that for the proposed project, with the exception that Ivanpah Unit 3 would be located four miles to the south. Therefore, the general environmental setting factors associated with the impacts to soil and water resources, including soil types, groundwater resources, other groundwater users in the region, and the position of the alternative with respect to surface water drainage features, would be almost the same for the proposed project and the Modified I-15 Alternative. However, a key difference between the setting for the Modified I-15 Alternative as compared to that of the proposed project would be the reconfigured location of Ivanpah Unit 3 with respect to the upstream stormwater drainage basins.

As discussed above, the size and number of drainage channels associated with the proposed project is highest in Ivanpah Unit 3. Elimination of the proposed project Ivanpah Unit 3 in the Modified I-15 Alternative would result in this area of active drainage channels being left undeveloped as part of the ISEGS project. The stormwater drainage basins and channels that would be associated with the revised Ivanpah Unit 3 location have not been completely mapped, modeled, or otherwise evaluated to determine their potential impact on the facility. The existing drainage channel mapping and stormwater modeling did extend approximately 0.5 miles to the south of Ivanpah Unit 1, and therefore covers approximately half of the revised Ivanpah Unit 3 location. Also, cursory visual inspection of the revised Ivanpah Unit 3 location and review of topographic maps of the upstream drainage basins has been conducted to develop a qualitative comparison of the proposed and revised Ivanpah Unit 3 locations. Based on these preliminary evaluations, the reconfigured location of Ivanpah Unit 3 appears to be in a similar, or possibly somewhat more favorable position than the proposed Ivanpah Unit 3 location, with respect to the size of upstream drainage basins and associated active drainage channels. Therefore, it is assumed that the stormwater drainage setting of the Modified I-15 Alternative is the same as that for the proposed project.

Construction Impacts

Potential construction-related impacts associated with the Modified I-15 Alternative would include:

- Soil erosion from grading and earthwork;

- Impacts to drainages, including Waters of the State;
- Stormwater and flooding impacts to facility infrastructure;
- Modification of downstream sedimentation and erosion characteristics; and
- Impacts to groundwater availability or quality.

As discussed above, the applicant has proposed a Low Impact Development approach which would minimize the amount of necessary grading and site disturbance by allowing stormwater to flow through the facility on its natural drainages. In the proposed project, active stormwater protection, in the form of diversion channels and berms, would be developed only around the power block and substation areas, leaving stormwater to flow unimpeded through the heliostat areas. Grading would be limited to the power block and substation areas, and to areas of the heliostat fields where existing channels are large enough to require grading to provide site access and a relatively flat area for installation of heliostats. These areas of the heliostat fields requiring grading were mostly limited to the northern portion of Ivanpah Unit 3. Overall, the acreage requiring grading in the proposed project was estimated to be 170 acres, and the acreage of active drainage pathways, designated as Waters of the State, was 198 acres.

Because the drainage channels in the revised Ivanpah Unit 3 location have not been fully evaluated, the extent of grading required in that area cannot be determined at this time. Therefore, although the Modified I-15 Alternative would eliminate the need for grading 170 acres in the proposed project, it could result in requiring a larger area of grading in the Modified I-15 Alternative. The impact of the Modified I-15 Alternative on active drainage pathways, which are designated as Waters of the State, also cannot be fully evaluated without detailed mapping and evaluation of the revised Ivanpah Unit 3 location. However, as stated above, a preliminary review of the stormwater drainage setting of the revised Ivanpah Unit 3 location suggests that the setting is similar to, or perhaps more favorable than, the original Unit 3 location in the proposed project. Therefore, impacts associated with the Modified I-15 Alternative are assumed to be approximately the same as those for the proposed project, and would be subject to the same mitigation measures.

The final issues associated with soil and water resources include potential impacts to groundwater resources, including the amount of groundwater available, as well as potential impacts to groundwater quality. The amount of water that would be used for any given period for construction of the proposed project would be the highest during construction of Ivanpah Unit 3, approximately 200 acre-feet per year, as compared to approximately 100 acre-feet per year for Ivanpah Units 1 and 2. The water volume required for Ivanpah Unit 3 would be higher due to the need for water to be used for dust control for the extensive grading needed in Ivanpah Unit 3. In the Modified I-15 Alternative, the acreage of required grading cannot be evaluated at this time, so the volume of water and duration of water usage to support grading in the revised Ivanpah Unit 3 location cannot be evaluated. Assuming the same approximate amount of grading, the peak water usage period for construction of Ivanpah Unit 3 in the Modified I-15 Alternative would be the same as that for the proposed project. Because the overall duration of water use for construction would be reduced for the Modified I-15

Alternative, potential groundwater use conflicts would be lower than those for the proposed project.

Similarly, potential sources of groundwater contamination during construction would be the same for the proposed project and the Modified I-15 Alternative. Because the duration of construction for the Modified I-15 Alternative would be reduced from 48 months to 40 months, the risk of contamination occurring would be reduced from that of the proposed project.

The source of water for construction, operations, and closure/decommissioning of the Modified I-15 Alternative would be slightly different from that in the proposed project. In the Modified I-15 Alternative, the location of the water production wells would be approximately 2400 feet northwest of their location in the proposed project. This location would be further from the wells operated by the Primm Valley Golf Course, and would therefore be less likely to affect those wells. Therefore, although the location of the water source would be slightly different in the Modified I-15 Alternative, the change in the location of the water production wells would not affect overall groundwater availability.

Operations Impacts

In the analysis of the proposed project, BLM and the Energy Commission evaluated the potential for stormwater flows from the mountains to the west of the project area to cause flooding or erosion damage to site infrastructure, including fences and heliostats. Both the applicant and BLM conducted stormwater modeling of the drainage basin, including active alluvial fan areas, to estimate to volume and velocity of stormwater flow to which the facility may be subjected during extreme precipitation events. Those calculations showed that stormwater-related scour could occur at the base of heliostats, and this erosion could potentially result in heliostats falling down and moving downstream during storm events. The concerns of BLM and the Energy Commission included the potential for stormwater damage to affect the financial viability of the ongoing operation of the facility, and the potential for these events to transport heliostat and mirror debris to areas downstream of the approved ROW grant. As a result, mitigation measures, in the form of a Storm Water Damage Monitoring and Response Plan, are proposed. The key components of this plan include:

- Installation of heliostats at a depth designed to withstand predicted levels of stormwater scour;
- Inspection of fences and heliostat fields following storm events to identify and correct damage; and
- Consideration of post-construction stormwater system design modifications, if needed to address ongoing issues.

All of these issues and concerns would remain for the Modified I-15 Alternative, as for the proposed project. The location of the Modified I-15 Alternative on the active alluvial fan would remain approximately the same, and the project would be constructed with the same Low Impact Development approach. Based on the assumption that the stormwater setting of the revised Ivanpah Unit 3 location is the same, or more favorable than, the proposed project, and the acreage reduction of approximately 12.5 percent, it is likely that the Modified I-15 Alternative has an overall lower level of risk for stormwater damage impacts. The proposed Storm Water Damage Monitoring and Response Plan, applied to the Modified I-15 Alternative in the same manner as the proposed project, would help to ensure that stormwater damage impacts do not occur, or are addressed and mitigated when they do occur.

Similar to the discussion of water use for construction, the only differences in water use between the Modified I-15 Alternative and the proposed project would be a small change in the location of the water production wells, and a reduction in the amount of water needed to clean heliostats. As stated in the discussion of construction impacts above, the change in the location of the wells in the Modified I-15 Alternative would not result in any change to potential water use impacts. By reducing the number of heliostats from 214,000 to 173,500 (a reduction of 19 percent), the amount of water used for heliostat washing would also be reduced by approximately 19 percent. Therefore, potential water use impacts associated with operation of the Modified I-15 Alternative would be reduced by 19 percent.

Closure and Decommissioning Impacts

The soil and water impacts associated with closure and decommissioning of the Modified I-15 Alternative would be similar to those described for construction above. Because decommissioning would include a smaller area, and have a shorter duration, the Modified I-15 Alternative would have a reduced potential for water use, water quality, and soil erosion impacts than the proposed project.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with soil and water resources. The recycling of process water would constitute a beneficial use of that water, as is encouraged through California state regulations and policies. However, this use would still ultimately be consumptive, and would not constitute an overall beneficial impact from the alternative.

4.10.2.4 No Action Alternative

The No Action Alternative is a proposed action that would not be undertaken. Under this alternative, the BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and could include consideration of another solar project.

- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on this and other sites in the Mojave Desert, or in adjacent states, as developers strive to provide renewable power that complies with utility requirements and state/federal mandates.

4.10.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

Clean Water Act

The proposed project would satisfy the requirements of the RWQCB with the adoption of the following mitigation measures: 1) Development of the DESCP in accordance with **Soil&Water-1**; 2) Development of a Storm Water Damage Monitoring and Response Plan in accordance with **Soil&Water-5**; and 3) Compliance with wastewater discharge requirements in accordance with **Soil&Water-2** and as specified in **Appendix B – Soil and Water, Parts B, C, and D**. In addition, the applicant would be required to comply with California Department of Fish and Game's Streambed Alteration Agreement requirements in accordance with mitigation measure **BIO-20**.

Department of Energy Floodplain and Wetland Environmental Review Requirements

Based on their review of the Draft EIS, DOE has determined that the analysis and assessment contained in this EIS, most notably Section 4.10.2.1, meets the requirements set forth in DOE's Compliance with Floodplain and Wetland Environmental Review Requirements (10 CFR Part 1022).

SWRCB Resolution 75-58, Energy Commission's 2003 Integrated Energy Policy Report, and the Warren Alquist Act

The California Energy Commission, under legislative mandate specified in the *2003 IEPR*, would approve the use of fresh water for cooling purposes by power plants it licenses only where alternative water supply sources and alternative cooling technologies are shown to be environmentally undesirable or economically unsound. SWRCB Resolution 75-78 states that fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. The Warren-Alquist Act promotes all feasible means of water conservation. Each of the proposed power plants include a steam turbine using an air-cooled condenser, which achieves maximum water conservation associated with cooling. Therefore, the proposed project complies with the requirements of SWRCB Resolution 75-78, the Energy Commission's 2003 IEPR, and the Warren-Alquist Act.

Public Resources Code, Sections 25300 through 25302

Through compliance with mitigation measure **Soil&Water-4**, information required to conduct assessments and forecasts of potable and industrial water consumption by power plants is achieved.

San Bernardino County Ordinance 3872 (Code Title 3, Division 3, Chapter 6, Article 5)

To help protect groundwater resources in San Bernardino County, the County enacted Ordinance 3872. This ordinance requires a permit to locate, construct, operate, or maintain a new groundwater well within the unincorporated, unadjudicated desert region of San Bernardino County. CEQA compliance must also be completed prior to issuance of a permit. The article does not apply to "groundwater wells located on Federal lands unless otherwise specified by inter-agency agreement." The BLM and County entered into a MOU that provides that the BLM will require conformance with Article 5 for all projects proposing to use groundwater from beneath public lands. The MOU provides that the County and BLM will work cooperatively together to ensure conformance with applicable laws and regulations by project developers on BLM land. As part of meeting the requirements of the County's permitting process, the County may require the project owner to prepare a groundwater monitoring plan in accordance with the County's "*Guidelines for Preparation of a Groundwater Monitoring Plan*" dated January 1998. Mitigation measure **Soil&Water-6** would require the project owner to ensure that all onsite groundwater wells would be installed in accordance with the County of San Bernardino requirements and to submit a well construction packet to the County for comment and written evaluation. The project owner would also be required to submit well completion reports to the DWR in accordance with the DWR well completion reporting requirements.

4.10.4 Mitigation Measures

Drainage, Erosion, and Sedimentation Control Plan

SOIL & WATER-1: Prior to site mobilization, the project owner shall obtain the BLM Authorized Officer and the CPM approval for a site specific DESCP that ensures protection of water quality and soil resources of the project site and all linear facilities for both the construction and operation phases of the project. This plan shall address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, and identify all monitoring and maintenance activities. The project owner shall complete all engineering plans, reports, and documents necessary for the BLM Authorized Officer and the CPM to conduct a review of the proposed project and provide a written evaluation as to whether the proposed grading, drainage improvements, and flood management activities comply with all requirements presented herein. The plan shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1** and shall contain the following elements:

- **Vicinity Map:** A map shall be provided indicating the location of all project elements with depictions of all major geographic features to include watercourses, washes, irrigation and drainage canals, major utilities, and sensitive areas.

- **Site Delineation:** The site and all project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, underground utilities, roads, and drainage facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale

- **Drainage:** The DESCP shall include the following elements:

  a. Topography. Topography for offsite areas are required to define the existing upstream tributary areas to the site and downstream to provide enough definition to map the existing storm water flow and flood hazard. Spot elevations shall be required where relatively flat conditions exist.

  b. Proposed Grade. Proposed grade contours shall be shown at a scale appropriate for delineation of onsite ephemeral washes, drainage ditches, and tie-ins to the existing topography.

  c. Hydrology. Existing and proposed hydrologic calculations for onsite areas and offsite areas that drain to the site; include maps showing the drainage area boundaries and sizes in acres, topography and typical overland flow directions, and show all existing, interim, and proposed drainage infrastructure and their intended direction of flow.

  d. Hydraulics. Provide hydraulic calculations to support the selection and sizing of the onsite drainage network, diversion facilities and BMPs.

- **Watercourses and Critical Areas:** The DESCP shall show the location of all onsite and nearby watercourses including washes, irrigation and drainage canals, and drainage ditches, and shall indicate the proximity of those features to the construction site. Maps shall identify high hazard flood prone areas.

- **Clearing and Grading:** The plan shall provide a delineation of all areas to be cleared of vegetation, areas to be preserved, and areas where vegetation would be cut to allow clear movement of the heliostats. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross-sections, cut/fill depths or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography tying in proposed contours with existing topography shall be illustrated. The DESCP shall include a statement of the quantities of material excavated at the site, whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported or a statement explaining that there would be no clearing and/or grading conducted for each element of the project. Areas of no disturbance shall be properly identified and delineated on the plan maps.

- **Soil Wind and Water Erosion Control:** The plan shall address exposed soil treatments to be used during construction and operation of the proposed project for both road and non-road surfaces including specifically identifying all chemical based dust palliatives, soil bonding, and weighting agents appropriate for use at the proposed project site that would not cause adverse effects to vegetation; BMPs shall include measures designed to prevent wind and water erosion including application of chemical dust palliatives after rough grading to limit water use. All dust palliatives, soil binders, and weighting agents shall be approved by the BLM Authorized Officer and the CPM prior to use.

- **Project Schedule:** The DESCP shall identify on the topographic site map the location of the site-specific BMPs to be employed during each phase of construction (initial grading, project element construction, and final grading/stabilization). BMP implementation schedules shall be provided for each project element for each phase of construction.
- **Best Management Practices:** The DESCP shall show the location, timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during project element excavation and construction, during final grading/stabilization, and after construction. BMPs shall include measures designed to control dust and stabilize construction access roads and entrances. The maintenance schedule shall include post-construction maintenance of treatment-control BMPs applied to disturbed areas following construction.
- **Erosion Control Drawings:** The erosion-control drawings and narrative shall be designed, stamped and sealed by a professional engineer or erosion-control specialist.
- **Agency Comments:** The DESCP shall include copies of recommendations from the County of San Bernardino, CDFG, and Lahontan RWQCB.
- **Monitoring Plan:** Monitoring activities shall include routine measurement of the volume of accumulated sediment in the onsite drainage ditches, and storm water diversions and the requirements specified in **Appendix B – Soil and Water, Parts B, C, and D**.

Verification: The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1**, and relevant portions of the DESCP shall be submitted to the Chief Building Official (CBO) for review and approval. In addition, the project owner shall do all of the following:

a. No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino and the RWQCB for review and comment. The BLM Authorized Officer and the CPM shall consider comments received from San Bernardino County and RWQCB and approve the DESCP.

b. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-, erosion- and sediment-control measures and the results of monitoring and maintenance activities.

c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.

d. Provide the BLM Authorized Officer and the CPM with two (2) copies each of all monitoring or compliance reports.

Waste Discharge Requirements

SOIL&WATER-2: The project owner shall comply with the requirements specified in **Appendix B – Soil and Water, Parts B, C, and D** for dredge and fill, wastewater, and storm water discharges associated with construction and industrial activity. The project owner shall develop, obtain the BLM Authorized Officer and the CPM approval of, and implement a construction SWPPP for the construction of the project and an Industrial SWPPP for operation of the project.

Verification: At least sixty (60) days prior to construction, the project owner shall submit to the BLM Authorized Officer and the CPM a copy of the construction SWPPP for construction of the project for review and approval. At least sixty (60) days prior to commercial operation, the project owner shall submit to the BLM Authorized Officer and the CPM a copy of the Industrial SWPPP for operation of the project for review and approval prior to commercial operation. The project owner shall retain a copy on site. The project owner shall submit copies to the BLM Authorized Officer and the CPM of all correspondence between the project owner and the RWQCB regarding the WDRs for discharge of storm water associated with construction and industrial activity within ten (10) days of its receipt or submittal.

Project Groundwater Wells

SOIL&WATER-3: Pre-Well Installation. The project owner shall construct and operate up to two onsite groundwater wells that produce water from the IVGB. The project owner shall ensure that the wells are completed in accordance with all applicable state and local water well construction permits and requirements, including the San Bernardino County's Desert Groundwater Management Ordinance. Prior to initiation of well construction activities, the project owner shall submit for review and comment a well construction packet to the County of San Bernardino, in accordance with the County of San Bernardino Code Title 2, Division 3, Chapter 6, Article 5, containing the documentation, plans, and fees normally required for the county's well permit, with copies to the both the BLM Authorized Officer and the CPM. The project shall not construct a well or extract and use groundwater until both the BLM Authorized Officer and the CPM provide approval to construct and operate the well.

Post-Well Installation. The project owner shall provide documentation to the BLM Authorized Officer and the CPM that the well has been properly completed. In accordance with California's Water Code section 13754, the driller of the well shall submit to the DWR a Well Completion Report for each well installed.

Verification: The project owner shall ensure the Well Completion Reports are submitted and shall ensure compliance with all county water well standards and requirements for the life of the wells. The project owner shall do all of the following:

1. No later than 180 days prior to the construction of the onsite groundwater wells, the project owner shall submit a Groundwater Monitoring and Management Plan to the County of San Bernardino for review and comment (see Condition of Certification **Soil&Water- 6**).
2. No later than sixty (60) days prior to the construction of the onsite groundwater wells, the project owner shall submit to the BLM Authorized Officer and the CPM a copy of the water well construction packet submitted to the County of San Bernardino for review and comment.
3. No later than thirty (30) days prior to the construction of the onsite water supply wells, the project owner shall submit a copy of any written comments received from the County of San Bernardino indicating whether the proposed well construction activities comply with all county well requirements and meet the requirements established by the county's water well permit program.
4. No later than sixty (60) days after installation of each well at the project site, the project owner shall provide to the BLM Authorized Officer and the CPM copies of the Well Completion Reports submitted to the DWR by the well driller. The project owner shall submit to the CPM, together with the Well Completion Report, a copy of well drilling logs, water quality analyses, and any inspection reports.
5. During well construction and for the operational life of the well, the project owner shall submit two (2) copies each to the BLM Authorized Officer and the CPM for review and approval any proposed well construction or operation changes.
6. The project owner shall provide BLM's Authorized Officer and the CPM with (2) two copies each of all monitoring and other reports required for compliance with the County of San Bernardino water well standards and operation requirements.
7. No later than fifteen (15) days after completion of the onsite water supply wells, the project owner shall submit documentation to BLM's Authorized Officer and the CPM confirming that well drilling activities were conducted in compliance with Title 23, California Code of Regulations, Chapter 15, Discharges of Hazardous Wastes to Land, (23 CCR, sections 2510 et seq.) requirements and that any onsite drilling sumps used for project drilling activities were removed in compliance with 23 CCR section 2511(c).

Construction and Operations Water Use

SOIL&WATER-4: The proposed project's extraction and use of groundwater during construction shall not exceed an average of 200 acre-feet per year over the forty-three (43) month construction period.

Groundwater extraction and use for operations activities shall not exceed 100 acre-feet per year. Prior to the use of groundwater for construction, the project owner shall install and maintain metering devices as part of the water supply and distribution system to document project water use and to monitor and record in gallons per day the total volume(s) of water supplied to the project from this water source. The metering devices shall be operational for the life of the project.

Verification: Beginning six (6) months after the start of construction, the project owner shall prepare a semi-annual summary of amount of water used for construction purposes. The summary shall include the monthly range and monthly average of daily water usage in gallons per day.

At least sixty (60) days prior to the start of construction of the proposed project, the project owner shall submit to the BLM Authorized Officer and the CPM a copy of evidence that metering devices have been installed and are operational.

The project owner shall prepare an annual summary, which will include daily usage, monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet. For years subsequent to the initial year of operation, the annual summary will also include the yearly range and yearly average water use by source. For calculating the total water use, the term “year” will correspond to the date established for the annual compliance report submittal.

Stormwater Damage Monitoring and Response Plan

SOIL&WATER-5: The project owner shall ensure that the heliostats are designed and installed to withstand storm water scour of that may occur as a result of a 100-year storm event. The analysis of the storm event and resulting heliostat stability will be provided within a Pylon Insertion Depth and Heliostat Stability Report to be completed by the applicant. This analysis will incorporate results from site-specific geotechnical stability testing, as well as hydrologic and hydraulic stormwater modeling performed by the applicant. The modeling will be completed using methodology and assumptions approved by the CPM and BLM's Authorized Officer.

The project owner shall also develop a Storm Water Damage Monitoring and Response Plan to evaluate potential impacts from storm water, including heliostats that fail due to storm water flow or otherwise break and scatter mirror debris on to the ground surface.

Verification: The basis for determination of pylon embedment depths shall employ a step-by-step process as identified below and approved by the BLM Authorized Officer and the CPM:

A. Determination of peak storm water flow within each sub-watershed from a 100-year event:

- Use of San Bernardino County Hydrology Manual to specify hydrologic parameters to use in calculations; and

- HEC -1 and Flo-2D models will be developed to calculate storm flows from the mountain watersheds upstream of the project site, and flood flows at the project site, based upon hydrologic parameters from San Bernardino County.

B. Determination of potential total pylon scour depth:

- Potential channel erosion depths will be determined using the calculated design flows, as determined in A above, combined with the methodology presented in “FAN, An Alluvial Fan Flooding Computer Program, FEMA, 1990.”
- Potential local scour will be determined using the calculated design flows, as determined in A above, combined with the FHWA equation for local bridge pier scour from the FHWA 2001 report, “Evaluating Scour at Bridges.”

C. The results of the scour depth calculations and pylon stability testing will be used to determine the minimum necessary pylon embedment depth within the active portions of the alluvial fans. In the inactive portions of the alluvial fans that are not subject to channel erosion and local scour, the minimum pylon embedment depths will be based on the results of the pylon stability testing. Active versus inactive areas of the alluvial fans will be determined from the USGS 2006 Open-File Report “Preliminary Surficial Geologic Map of the Mesquite Lake 30’ x 60’ Quadrangle, California and Nevada” authored by Schmidt and McMackin and field observations.

D. The results of the calculated peak storm water flows and channel erosion and heliostat scour analysis together with the recommended heliostat installation depths shall be submitted to the BLM Authorized Officer and the CPM for review and approval sixty (60) days before the start of heliostat installation.

The Storm Water Damage Monitoring and Response Plan shall be submitted to both the BLM Authorized Officer and CPM for review and approval and shall include the following:

- Detailed maps showing the installed location of all heliostats within each project phase;
- Description of the method of removing all soil spoils should any be generated;
- Each heliostat should be identified by a unique ID number marked to show initial ground surface at its base, and the depth of the pylon below ground;
- Minimum Depth Stability Threshold to be maintained of pylons to meet long-term stability for applicable wind, water and debris loading effects;
- Above and below ground construction details of a typical installed heliostat;
- BMPs to be employed to minimize the potential impact of broken mirrors to soil resources;
- Methods and response time of mirror cleanup and measures that may be used to mitigate further impact to soil resources from broken mirror fragments; and
- Monitoring, documenting, and restoring the Ivanpah playa surface when impacted by sedimentation or broken mirror shards.

A plan to monitor and inspect periodically, before first seasonal and after every storm event:

- Security and Tortoise Exclusion Fence: Inspect for damage and buildup of sediment or debris.
- Heliostats within Drainages or subject to drainage overflow: Inspect for tilting, mirror damage, depth of scour compared to pylon depth below ground and the Minimum Depth Stability Threshold, collapse, and downstream transport.
- Drainage Channels: Inspect for substantial migration or changes in depth, and transport of broken glass.
- Constructed Diversion Channels: Inspect for scour and structural integrity issues caused by erosion, and for sediment and debris buildup.
- Ivanpah Playa Surface: Inspect for changes in the surface texture and quality from sediment buildup, erosion, or broken glass.

Short-Term Incident-Based Response:

- Security and Tortoise Exclusion Fence: repair damage, and remove built-up of sediment and debris.
- Heliostats: Remove broken glass, damaged structure, and wiring from the ground, and for pylons no longer meeting the Minimum Depth Stability Threshold, either replace/reinforce or remove the mirrors to avoid exposure for broken glass.
- Drainage Channels: no short-term response necessary unless changes indicate risk to facility structures.
- Constructed Diversion Channels: repair damage, maintain erosion control measures and remove built-up sediment and debris.

Long-Term Design-Based Response:

- Propose operation/BMP modifications to address ongoing issues. Include proposed changes to monitoring and response procedures, frequency, or standards.
- Replace/reinforce pylons no longer meeting the Minimum Depth Stability Threshold or remove the mirrors to avoid exposure for broken glass.
- Propose design modifications to address ongoing issues. This may include construction of active storm water management diversion channels and/or detention ponds.
- Inspection, short-term incident response, and long-term design-based response may include activities both inside and outside of the approved right-of-way. For activities outside of the approved right-of-way, the applicant will notify BLM and acquire environmental review and approval before field activities begin.

At least sixty (60) days prior to construction, the project owner shall submit to the BLM Authorized Officer and the CPM a copy of the Pylon Insertion Depth and Heliostat Stability Report for review and approval prior to construction. At least sixty (60) days prior to commercial operation, the project owner shall submit to the BLM Authorized Officer and the CPM a copy of the Storm Water Damage Monitoring and Response Plan for review and approval prior to commercial operation. The project owner shall retain a copy of this plan onsite at the power plant at all times. The project owner shall prepare an annual summary of the number of heliostats failed, cause of the failure, and cleanup and mitigation performed for each failed heliostat.

Groundwater Level Monitoring and Reporting Plan

SOIL&WATER-6: The project owner shall submit a Groundwater Level Monitoring and Reporting Plan to the BLM Authorized Officer and the CPM for review and approval and to San Bernardino County for review and comment regarding consistency with the County of San Bernardino Code Title 2, Division 3, Chapter 6, Article 5 (Desert Groundwater Management Ordinance). The Groundwater Level Monitoring and Reporting Plan shall provide a description of the methodology for monitoring background and site groundwater levels. Monitoring shall include pre-construction, construction, and project operation water use. The primary objective for the monitoring is to establish pre-construction and project related groundwater levels that can be quantitatively compared against observed and simulated levels near the project pumping well and near potentially impacted existing wells.

Prior to project construction, monitoring shall commence to establish pre-construction base-line conditions and shall incorporate the existing monitoring and reporting data collected for the Primm Valley Golf Club. The monitoring network shall be designed to incorporate the ongoing monitoring and reporting program established for the Primm Valley Golf Course. The monitoring plan and network may make use of existing wells in the basin that would satisfy the requirements for the monitoring program.

Verification: The project owner shall complete the following:

1. At least three (3) months prior to construction, a Groundwater Level Monitoring and Reporting Plan shall be submitted to the County of San Bernardino for review and comment before completion of Condition of Certification **Soil&Water-3**, and a copy of the County's comments and the plan shall be submitted to the BLM Authorized Officer and the CPM for review and approval. The Plan shall include a scaled map showing the site and vicinity, existing well locations, and proposed monitoring locations (both existing wells and new monitoring wells proposed for construction). The map shall also include relevant natural and man-made features (existing and proposed as part of this project). The plan also shall provide: (1) well construction information and borehole lithology for each existing well proposed for use as a monitoring well; (2) description of proposed drilling and well installation methods; (3) proposed monitoring well design; and, (4) schedule for completion of the work.
2. At least two (2) months prior to construction, a Well Monitoring Installation and Groundwater Level Network Report shall be submitted to the BLM Authorized Officer and the CPM. The report shall include a scaled map showing the final monitoring well network. It shall document the drilling methods employed, provide individual well construction as-builds, borehole lithology recorded from the drill cuttings, well

development, and well survey results. The well survey shall measure the location and elevation of the top of the well casing and reference point for all water level measurements, and shall include the coordinate system and datum for the survey measurements. Additionally, the report shall describe the water level monitoring equipment employed in the wells and document their deployment and use.

3. As part of the monitoring well network development, all newly constructed monitoring wells shall be permitted and constructed consistent with San Bernardino County and State specifications.
4. At least two (2) months prior to project construction, all water level monitoring data shall be provided to the BLM Authorized Officer and the CPM. The data transmittal shall include an assessment of pre-project water levels, a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and a comparison and assessment of water level data relative to the assumptions and spatial levels simulated by the applicant's groundwater model.
5. After project construction and during project operations, the project owner shall submit the monitoring data annually to the BLM Authorized Officer and the CPM. The summary shall document water level monitoring methods, the water level data, water level plots, and a comparison between pre- and post-project start-up water level trends. The report shall also include a summary of actual water use conditions, monthly climatic information (temperature and rainfall), and a comparison and assessment of water level data relative to the assumptions and spatial levels simulated by the applicant's groundwater model.

Wastewater Collection System Requirements

SOIL&WATER-7: The project owner shall recycle and reuse all process wastewater streams to the extent practicable. Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable regulations (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).

Verification: Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable regulations (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).

Septic System and Leach Field Requirements

SOIL&WATER-8: Prior to the start of construction of the sanitary waste system, the project owner shall submit to the County of San Bernardino for review and comment, and to the BLM Authorized Officer and the CPM for review and approval, plans for the construction and operation of the project's proposed sanitary waste septic system and leach field. These plans shall comply with the requirements set forth in County of San Bernardino codes and **Appendix B – Soil and Water, Parts B, C, and D**. Project construction shall not proceed until both the BLM Authorized Officer and the CPM have approved the plans. The project owner shall remain in compliance with the San Bernardino County code requirements for the life of the project.

Verification: Sixty (60) days prior to the start of commercial operations, the project owner shall submit to the County of San Bernardino appropriate fees and plans for review and comment for the construction and operation of the project's sanitary waste septic system and leach field. A copy of these plans shall be submitted to the BLM Authorized Officer and the CPM for review and approval. The plans shall demonstrate compliance with the sanitary waste disposal facility requirements of County of San Bernardino and **Appendix B – Soil and Water, Parts B, C, and D**.

4.10.5 Summary

Construction, operation, and decommissioning of the proposed project could potentially impact soil and water resources. Where these potential impacts have been identified, mitigation measures are required to reduce the potential for their occurrence and their magnitude. With these mitigation measures implemented, the project would conform with all applicable laws and regulations. Potential impacts to soil and water resources are summarized as follows:

1. The proposed project would be located on an alluvial fan where flash flooding and mass erosion could impact the project. Project-related changes to the alluvial fan hydrology could result in impacts to adjacent land users and the Ivanpah playa. The applicant completed a hydrologic study and modeling of the alluvial fan. Based on this work and subsequent confirmatory and sensitivity modeling conducted by the BLM, scour analyses have been performed to support development of a project design that can withstand flash flood flows with minimal damage to site structures and heliostats. In addition, a DESCP has been developed to mitigate the potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are imprecise and have limitations and uncertainties associated with them. Given the uncertainty associated with the calculations, the magnitude of potential impacts that could occur cannot be determined precisely. As discussed in the Biological Resources and Recreation sections, the potential effects associated with storm water and sedimentation impacts could adversely affect habitat for a threatened species (the desert tortoise), as well as recreational use of Ivanpah Playa. Should these impacts occur, they would likely be highly controversial. Based on these factors, the proposed project could result in direct, adverse impacts. Therefore, mitigation measure **Soil&Water-5** that defines monitoring, inspection, and damage response requirements, as well as standards and procedures for re-considering the proposed storm water management approach if needed in the future.

2. The proposed project would use an air-cooled condenser for heat rejection and would recycle process wastewater from all plant equipment, including boilers and water treatment equipment, to the extent practicable. Recycling the wastewater would maximize reuse of process water and conserve freshwater. Use of this technology would substantially reduce water use and is consistent with water policy and the constitutional requirement that State water resources be put to beneficial use to the fullest extent possible.
3. There would be no adverse impacts to groundwater supply and quality. In the Ivanpah Valley Groundwater Basin, two substantial components of the basin's water balance are groundwater recharge through precipitation and groundwater loss through well pumping. Both precipitation and pumping in the basin will vary over the 50-year life of the proposed project. To ensure that the project's proposed use of groundwater does not adversely impact the beneficial uses and users of the groundwater in the basin, the project would become part of the existing groundwater monitoring and reporting program developed by San Bernardino County for the Primm Valley Golf Club. Substantial changes to groundwater levels caused by the proposed project would be documented by this monitoring and reporting program in accordance with mitigation measure **Soil&Water-6**.

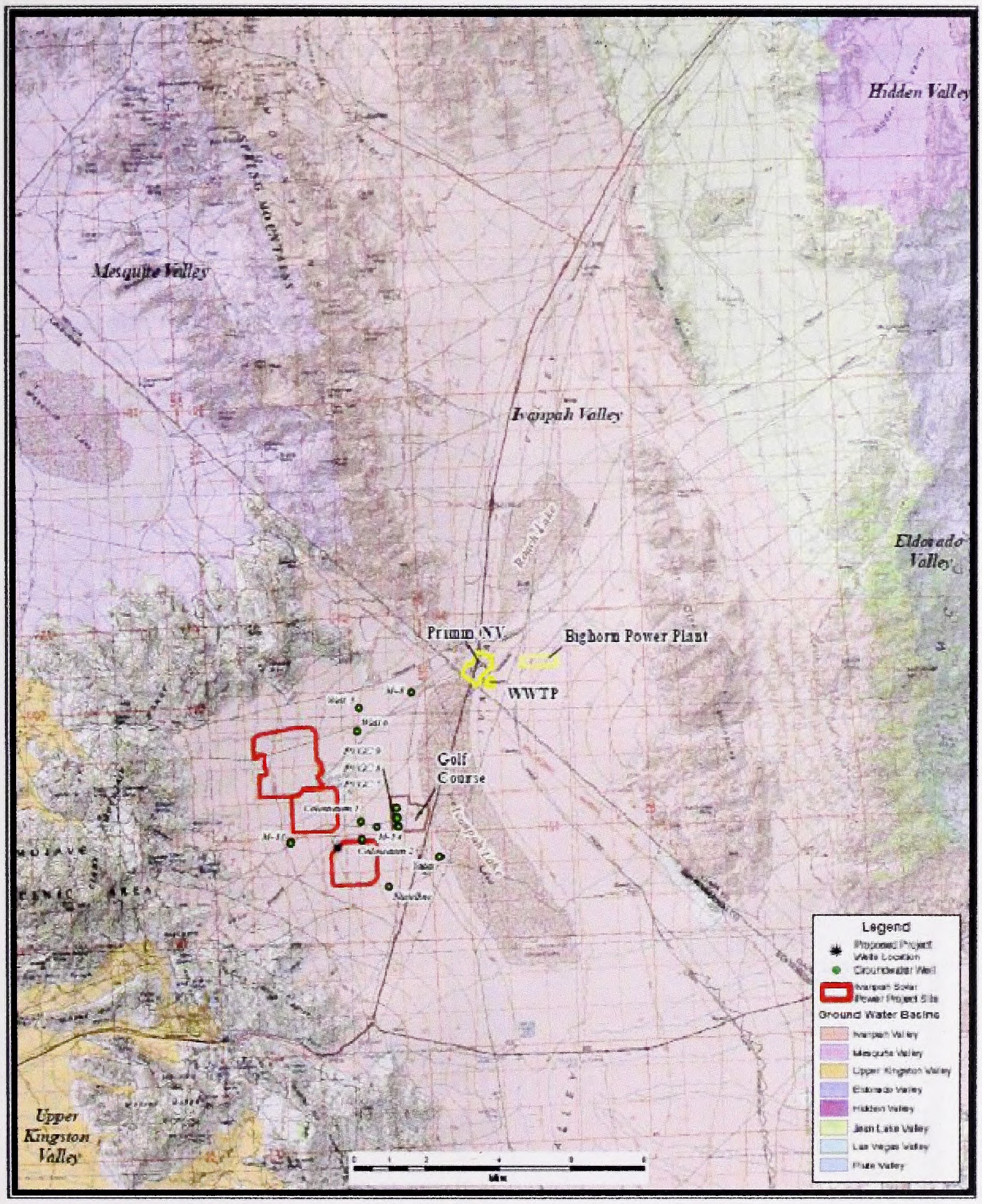
Overall, the potential for soil and water impacts associated with the Mitigated Ivanpah 3 Alternative would be either the same as, or reduced from those associated with the proposed project. Some of these potential impacts, including soil erosion associated with site grading and potential stormwater damage to the facility would be reduced substantially, because of the nature of stormwater drainage on the 433-acre northern portion of Ivanpah Unit 3 that would be eliminated. The Mitigated Ivanpah 3 Alternative would also use a reduced amount of groundwater for washing of heliostats, and would therefore reduce potential groundwater use conflicts.

The potential impacts of the Modified I-15 Alternative on soil erosion due to grading, Waters of the State, and stormwater damage to facility infrastructure cannot be fully evaluated at this time, because complete drainage channel mapping and stormwater modeling of the revised Ivanpah Unit 3 location has not been performed. However, based on a preliminary evaluation of the existing drainage mapping, stormwater modeling, and topographic maps of the area, it is likely that the soil and water impacts associated with the Modified I-15 Alternative would be either similar to or lower than those of the proposed project. The Modified I-15 Alternative would also use a reduced amount of groundwater for washing of heliostats, and would therefore reduce potential groundwater use conflicts.

Table 4.10-15
Comparison of Soil and Water Impacts

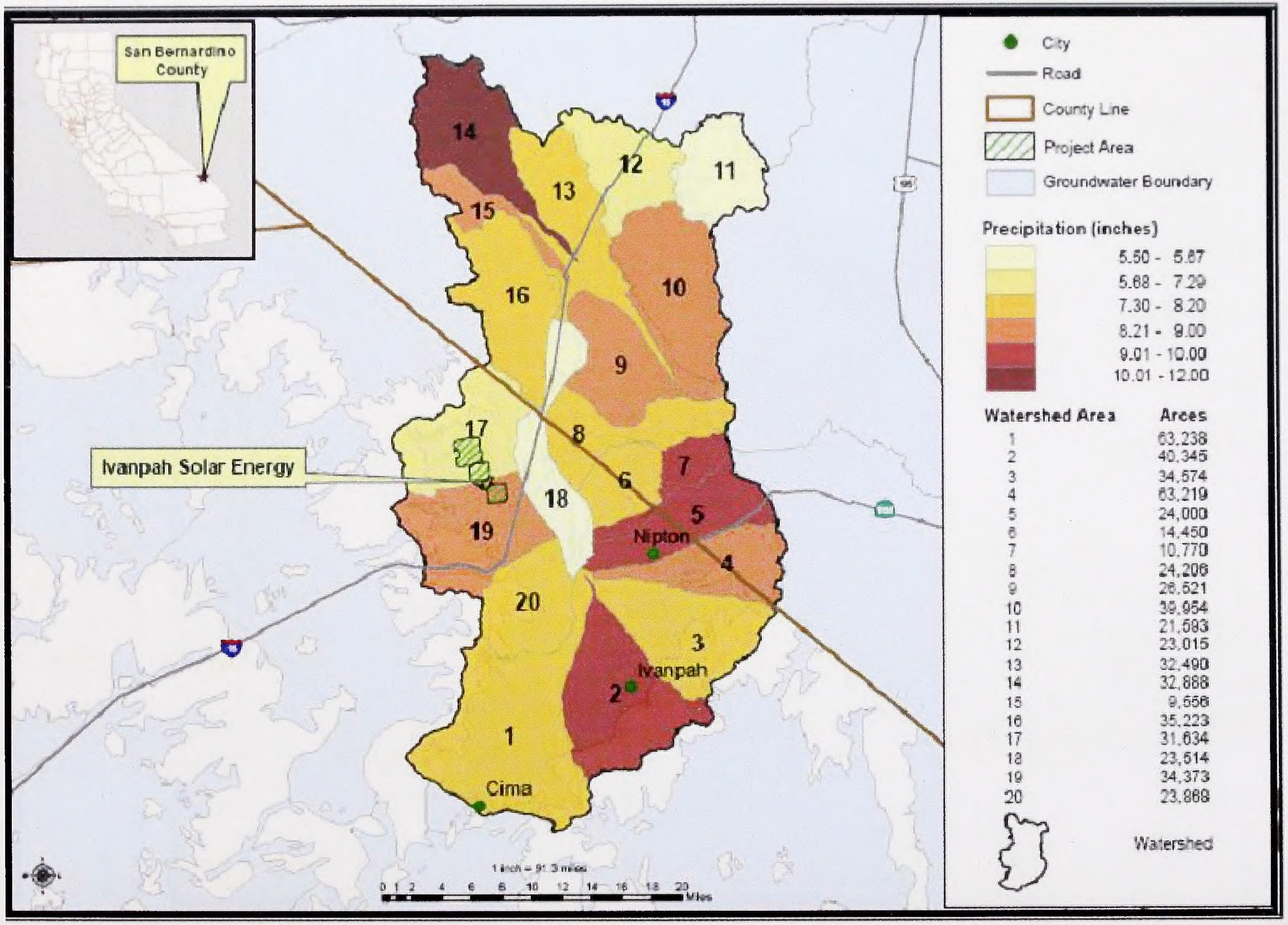
Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Soil erosion	No potential impact with regulatory compliance and mitigation measures	Substantially lower than proposed project, but still higher than No Action. No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, but higher than No Action. No potential impact with regulatory compliance and mitigation measures	No potential impact
Water of the State	Approximately 198 acres in project area	Approximately 174 acres in project area	Unknown, but likely to be about the same in project area	No potential impact
Stormwater impacts to facility infrastructure	Adverse impacts could occur, would be addressed under Storm Water Damage Monitoring and Response Plan	Adverse impacts could occur, but would be substantially lower than proposed project. Impacts would be addressed under Storm Water Damage Monitoring and Response Plan	Adverse impacts could occur, and would likely be approximately the same as the proposed project. Impacts would be addressed under Storm Water Damage Monitoring and Response Plan	No potential impact
Modification to downstream sedimentation and erosion characteristics	Impacts not expected, but potential would be addressed under Storm Water Damage Monitoring and Response Plan	Impacts not expected, and would be lower than proposed project. Potential would be addressed under Storm Water Damage Monitoring and Response Plan	Impacts not expected, but potential would be addressed under Storm Water Damage Monitoring and Response Plan	No potential impact
Groundwater availability	Impacts not expected, but potential would be addressed under Groundwater Level Monitoring and Reporting Plan	Impacts not expected, and would be lower than proposed project. Potential would be addressed under Groundwater Level Monitoring and Reporting Plan	Impacts not expected, and would be lower than proposed project. Potential would be addressed under Groundwater Level Monitoring and Reporting Plan	No potential impact
Groundwater quality	No potential impact with regulatory compliance and mitigation measures	No potential impact with regulatory compliance and mitigation measures	No potential impact with regulatory compliance and mitigation measures	No potential impact

Figure 4.10-1
Ivanpah Solar Power Project -Local Ground Water Basins


Hidden Valley
Mesquite Valley
Clark Mountains
Ivanpah Valley
Roach Lake
Eldorado Valley
Primm NV
Bighorn Power Plant
WWTP
Golf Course
Ivanpah Lake
Mojave
Scenic Area
Upper Kingston Valley
0
1
2
4
6
8
Miles
Legend
Proposed Project Wells Location
Groundwater Well
Ivanpah Solar Power Project Site
Ground Water Basins
Ivanpah Valley
Mesquite Valley
Upper Kingston Valley
Eldorado Valley
Hidden Valley
Jean Lake Valley
Las Vegas Valley
Piute Valley

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: California Energy Commission - USGS 100K TOPO

Figure 4.10-2
Ivanpah Solar Power Project -1971 to 2000 Annual Average Precipitation with PRISM


San Bernardino County
Ivanpah Solar Energy
14
15
13
12
11
16
10
9
17
8
7
6
18
5
Nipton
4
19
20
3
Ivanpah
2
1
Cima
1 inch = 91.3 miles
0 1 2 4 6 8 10 12 14 16 18 20 Miles
City
Road
County Line
Project Area
Groundwater Boundary
Precipitation (inches)
5.50 - 5.87
5.88 - 7.29
7.30 - 8.20
8.21 - 9.00
9.01 - 10.00
10.01 - 12.00
Watershed Area
Arces
1 63,238
2 40,345
3 34,574
4 63,219
5 24,000
6 14,450
7 10,770
8 24,206
9 26,521
10 39,954
11 21,583
12 23,015
13 32,490
14 32,888
15 9,556
16 35,223
17 31,634
18 23,514
19 34,373
20 23,868
Watershed

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2005
SOURCE: Precipitation - USDA Geospatial Data Gateway, PRISM Group (Oregon State University). Watershed - AFC Volumne 1 (2007), DWR California, DWR Nevada.

4.11 Traffic and Transportation

Introduction

In this section, BLM addresses the extent to which the project may impact the transportation system in the local area. This analysis focuses on (1) whether construction and operation of the Ivanpah ISEGS Project would result in traffic and transportation impacts and (2) if the project would be in compliance with applicable laws and regulations.

In this analysis BLM identifies the (1) the roads and routings that are proposed for use for construction and operation; (2) potential traffic-related problems associated with the use of those routes by construction workers and truck drivers; (3) anticipated encroachments upon public rights-of-way during the construction of the proposed project and associated facilities; (4) frequency of trips and probable routes associated with the delivery of hazardous materials; (5) possible effect of project operations on local airport flight traffic; and (6) potential health and safety effects of project-related glare.

Resource-Specific Project Description

The project site is located approximately one mile west of the Yates Well Road interchange on Interstate 15 (I-15) in San Bernardino County, approximately 3.1 miles west of the California-Nevada border. Access to the site is via the Yates Well Road interchange on I-15 and Colosseum Road (CH2M Hill 2007, p. 2-3). The project site is vacant with the exception of a 115 kV electrical transmission line (CH2M Hill 2007 p.2-4) and the two-lane Colosseum Road. The project site is surrounded by open space with the exception of a golf course located approximately one mile east of the site. Parking for construction workers would be provided at the on-site laydown areas located on the outside edges of the heliostat fields (CH2M Hill 2007, p. 2-17).

Applicable Laws, Regulations, and Supplemental Authorities

Table 4.11-1 provides a general description of adopted federal, state, and local laws and regulations pertaining to traffic and transportation relevant to the proposed project.

Table 4.11-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law	Description
Federal	
Code of Federal Regulations, Title 14 Aeronautics and Space, Part 77 Objects Affecting Navigable Airspace (14 CFR 77)	This regulation, under the jurisdiction of the FAA, establishes standards for determining physical obstructions to navigable airspace; sets noticing and hearing requirements; and provides for aeronautical studies to determine the effect of physical obstructions to the safe and efficient use of airspace.
CFR, Title 49, Subtitle B	49 CFR Subtitle B includes procedures and regulations pertaining to interstate and intrastate transport (including hazardous materials program procedures) and provides safety measures for motor carriers and motor vehicles that operate on public highways.
State	
California Vehicle Code (CVC), Division 2, Chapter 2.5; Div. 6; Chap. 7; Div. 13; Chap. 5; Div. 14.1; Chap. 1 & 2; Div. 14.8; Div. 15	This code includes regulations pertaining to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and the transportation of hazardous materials.
California Streets and Highway Code, Division 1, Chapter 3; Division 2 Chapter 5.5	This code includes regulations for the care and protection of state and county highways and provisions for the issuance of written permits.
Local	
San Bernardino Associated Governments (SANBAG) Regional Transportation Plan	Identifies public policies and strategies for the transportation system in the San Bernardino County region.
SANBAG Congestion Management Plan (CMP)	Requires maintenance of level of service (LOS) E or better on CMP segments.
San Bernardino County General Plan	Establishes regional transportation objectives, policies, and implementation measures for various modes of transportation.
San Bernardino County Code, Title 5, Division 1, Highway Permit	Addresses permitting requirements for oversize/overweight vehicles.

4.11.1 Affected Environment

Critical Roads and Freeways

Figures 4.11-1 and Figure 4.11-2 show the regional and local transportation features as described in the AFC. Information about critical roadways follows. This information is based on the Traffic and Transportation section of the AFC (CH2M Hill 2007, p.5.12-9) as well as traffic data from the California Department of Transportation (Caltrans) and the County of San Bernardino.

Interstate 15 (I-15)

I-15 is a north-south divided freeway linking Los Angeles, California, to Las Vegas, Nevada. I-15 also extends from California through Nevada, Utah, Idaho, and Montana. Access from I-15 to the project site is provided via Yates Well Road. At this location I-15 consists of two lanes in each direction. Caltrans reports that I-15 carries approximately 59,690 daily vehicle trips near the ISEGS site (Caltrans 2007a).

Yates Well Road

Yates Well Road is a two-lane east-west local road providing direct access to I-15 (Caltrans 2007b). The ramp terminal intersections at the I-15/Yates Well Road Interchange are stop-controlled. No other controlled intersections exist on Yates Well Road in the vicinity of the project (CH2M Hill 2007, p.5.12-9). San Bernardino County reports that Yates Well Road carries approximately 249 daily vehicle trips between I-15 and Colosseum Road (COSB 2007b).

Colosseum Road

Colosseum Road, an east-west two-lane direct road, provides access to the site and the Primm Valley Golf Club. Colosseum Road is located both on and immediately to the east of the project site and connects to Yates Well Road. The County of San Bernardino does not have any traffic counts on record for Colosseum Road (COSB 2007b).

Level of Service

LOS is a qualitative measure used to describe operational conditions within a traffic stream. LOS is used to describe and quantify the congestion level on a particular roadway or intersection in terms *speed*, *travel time,* and *delay*. The 2000 *Highway Capacity Manual*[27] defines six levels of service for roadways or intersections ranging from LOS A-- the best operating conditions--to LOS F—the worst. See **Appendix B - Traffic and Transportation** for additional information.

The County of San Bernardino uses the LOS criteria to assess the performance of its street and highway system and the capacity of roadway segments (COSB 2007b). The County's Threshold Standards Policy requires that LOS C or better be maintained on roadway segments under the County's jurisdiction (COSB 2006).

The San Bernardino Associated Governments (SANBAG) has adopted a Congestion Management Program (CMP). The CMP defines a network of state highways and arterials, level of service standards, and related procedures. The CMP's level of service standard requires all CMP segments to operate at LOS E or better. I-15 is a CMP roadway.

Table 4.11-2 includes information about the existing LOS for potentially affected intersections in the project area. LOS A represents free-flowing traffic; whereas, LOS F represents slow-moving or stalled traffic (overcapacity operation). All intersections currently operate at LOS A.

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[27] The *Highway Capacity Manual* is the most widely used resource for traffic analysis. The Highway Capacity Manual is prepared by the Transportation Research Board, Committee on Highway Capacity and Quality of Service. The current edition was published in 2000.

Table 4.11-2
Existing Intersection Level of Service

Intersection	AM Peak Hour	PM Peak Hour
Colosseum Road at Yates Well Road Westbound left/through approach	A	A
Colosseum Road at Yates Well Road Northbound left/right approach	A	A
I-15 southbound ramps at Yates Well Road Westbound left/through approach	A	A
I-15 southbound ramps at Yates Well Road Southbound left/through/right approach	A	A
I-15 northbound ramps at Yates Well Road Eastbound left/through approach	A	A
I-15 northbound ramps at Yates Well Road Northbound left/through/right approach	A	A

Source: CH2M Hill 2007, page 5.12-11

Table 4.11-3 includes information about the existing volume-to-capacity (V/C) ratios and LOS for potentially affected roadway segments in the project vicinity.

Table 4.11-3
Average Daily Level of Service Summary for Existing Conditions

Name	Design Capacity	Volume1	V/C2	LOS3
Colosseum Road	3,000	NA	NA	A
Yates Well Road	6,000	249	0.04	A
I-15 NB & SB	72,000	59,690	0.83	C

1. Volume data for Colosseum Road a 2-lane dirt road is not maintained, however, based on field observation, this road is seldom used (CH2M Hill 2007, p. 5.12-17). Sources of capacity and volume data for Yates Well Road and I-15 are, TRB 2000, COSB 2007b, and Caltrans 2007a.
2. V/C = volume-to-capacity ratio;
3. LOS = level of service

Although I-15 operates at LOS C or better most days of the week (Monday through Thursday), northbound I-15 experiences increased traffic volumes on Friday afternoons because of commuter and tourist traffic from California to Las Vegas, Nevada. On most days, as presented in **Table 4.11-3**, I-15 experiences an average daily traffic volume of approximately 60,000 trips—or an hourly average of approximately 1,200 trips. However, on Fridays from approximately 12 p.m. to 10 p.m., northbound I-15 experiences an hourly average that ranges between approximately 1,700 and 2,000 trips and operates at LOS F (CH2M Hill 2007, p. 5.12-11 and Figure 5.12-5).

Railways

An active Union Pacific Railroad line exists approximately five miles east of the project site (BNSF 2005). Project construction traffic is not expected to cross this rail line (CH2M Hill 2007, p. 5.12-11).

Public Transportation

No public transit service exists in the vicinity of the project site. Amtrak serves the corridor via bus only, with service between Las Vegas and Los Angeles. Many private bus companies operate on demand for Primm Valley Golf Club customers; but no established regular schedule exists (CH2M Hill 2007, p. 5.12-11).

Bicycle Routes

No bicycle facilities exist in the project area (CH2M Hill 2007, p. 5.12-11).

Airports

One existing public airport, Jean Airport, is located approximately 14 miles northeast of the project site and one mile south of Jean, Nevada. In addition, the Southern Nevada Supplemental Airport is proposed for the same area. Jean Airport has two paved runways that serve less than 50 aircraft, most of which are single engine airplanes and gliders (AirNav.com 2008).

In addition, the FAA and the BLM are currently preparing an Environmental Impact Statement for a proposed Southern Nevada Supplemental Airport to be constructed on approximately 6,000 acres of land just south of Jean, Nevada (VHB 2008). As currently planned, the proposed Southern Nevada Supplemental Airport would provide sufficient airport capacity to accommodate future aircraft operations and aviation passenger demand in the Las Vegas Metropolitan Area (VHB 2008). The proposed ISEGS would be located approximately 40,000 feet (7.6 miles) southwest of the nearest runway at the proposed Southern Nevada Supplemental Airport.

4.11.2 Environmental Consequences

Methodology

To determine whether an adverse impact would be generated by a project, BLM reviewed the project using the following criteria, as well as compliance with applicable laws and regulations. Specifically, BLM analyzed whether the proposed project would:

- Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections);
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;

- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Generate glare that could present a hazard to roadway vehicle traffic or aircraft;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access;
- Result in inadequate parking capacity; and
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

In addition BLM analyzed two additional potential traffic and transportation impacts concerning (1) nearby school operations and (2) transportation of hazardous materials. However, no schools are located within at least 30 miles of ISEGS site. Consequently, this EIS does not contain such an analysis. However, an analysis of the impacts of transporting hazardous materials may be found in the Operation Impacts and Mitigation subsections.

4.11.2.1 Proposed Project

Construction Impacts

Facility construction is projected to take place over 48 months, beginning in first quarter 2009 and completed in last quarter 2012. Construction activities would generally occur from Monday through Saturday between the hours of 5 a.m. and 7 p.m. However, additional hours may be necessary to compensate for schedule deficiencies or to complete critical construction activities. **Table 4.11-4** contains peak construction traffic estimates for the ISEGS.

Table 4.11-4
Daily and Peak Hour Estimated Construction Trip Generation

Trip Type	Average Daily Traffic	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Container trucks for heliostat fields	7	7	0	7	0	7	7
Delivery trucks for power block	2	2	0	2	0	2	2
Heavy vehicles for power block	3	3	0	3	0	3	3
Worker Busses	39	39	0	39	0	39	39
Private Vehicles	192	192	0	192	0	192	192
Total Construction Traffic	**243**	**243**	**0**	**243**	**0**	**243**	**243**

Source: CH2M Hill 2007, p. 5.12-15

The assumptions on which the information in **Table 4.11-4** is based are as follows:

1. Sixty percent of the 959 staff would arrive to the site by bus transport (15 people per bus) and 40 percent of staff would arrive by private vehicle typically with two persons per vehicle. During peak construction, workers would commute to the site in 39

busses and 192 private vehicles for a total of 231 trips. As included in **Table 4.11-4**, delivery of construction materials during peak construction would require seven container trucks for heliostat fields; two delivery trucks for the power block; and three heavy vehicles for the power block, for a total of 12 truck trips per day (CH2M Hill 2007, p 5.12-15). Therefore, a total of 243 construction vehicles are expected to drive to the site each day during peak construction.

2. Ninety-five percent of workers in private vehicles (183 vehicles) would originate in Las Vegas, Nevada. The remaining five percent of workers (9 private vehicles) as well as the trucks transporting the heliostats and power bloc would travel from California. Therefore, a total of 227 vehicles would travel from Nevada (39 busses; 183 private vehicles; 5 power block item deliveries) and 16 vehicles (9 private vehicles and 7 heliostat item deliveries) would travel from California (CH2M Hill 2007, p 5.12-15). Although construction materials would likely arrive at the site throughout the day, all construction-related trips would arrive at the project site during the AM peak hour and would depart the site during the PM peak hour.

A Highway Capacity Manual intersection analysis was conducted for the six approaches that would be directly affected by project construction traffic. Peak construction period intersection volumes were generated by adding the project peak intersection volumes to the existing peak intersection volumes. **Table 4.11-5** includes information about the change in LOS with the addition of project peak construction traffic during the morning and afternoon peak hours.

Table 4.11-5
Peak Hour Levels of Service During Project Peak Construction

Intersection	Existing				With Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Trips	LOS	Trips	LOS	Trips	LOS	Trips	LOS
Colosseum Road at Yates Well Road; westbound left/through approach	7	A	26	A	7	A	269	A
Colosseum Road at Yates Well Road; northbound left/right approach	26	A	7	A	269	A	7	A
I-15 southbound ramps at Yates Well Road; westbound left/through approach	8	A	7	A	24	A	3	A
I-15 southbound ramps at Yates Well Road; southbound left/through/right approach	26	A	3	A	253	A	248	A
I-15 northbound ramps at Yates Well Road; eastbound left/through approach	5	A	3	A	5	A	3	A
I-15 northbound ramps at Yates Well Road; northbound left/through/right approach	8	A	19	A	24	A	246	B

Source: CH2M Hill 2007, page 5.12-11, Figure 5.12-3, and Figure 5.12-4; and CH2M Hill 2008g.

As indicated in **Table 4.11-5**, all intersections would continue to operate at an acceptable level of service (LOS C or better) in the morning and afternoon peak hours with the addition of peak construction traffic. Construction traffic would result in a change to the level of service at the intersection of the I-15 northbound ramps and Yates Well Road from LOS A to LOS B during the PM peak hour. However this change would not be likely to result in direct, adverse impacts because it would be above LOS C.

Table 4.11-6 includes information about the predicted change to critical road segment LOS levels during construction of the ISEGS. As indicated in the table, project-related construction traffic would not cause the LOS on project area roadway segments to decline. All roadway segments would continue to operate at LOS C or better.

Table 4.11-6
Intersection LOS Analysis with Project Construction Traffic

Roadway Segment on Main Street	Capacity (vehicle/ day)	Existing			Construction Traffic (vehicle/ day)	With Project		
		Volume (vehicle/ day)	V/C	LOS		Volume (vehicle/ day)	V/C	LOS
Colosseum Road	3,000	NA	NA	A	243	0.08	NA	A
Yates Well Road	6,000	249	0.04	A	243	492	0.08	A
I-15 NB & SB	72,000	59,690	0.83	C	243	59,933	0.83	C

- Volume data for Colosseum Road a 2-lane dirt road is not maintained, however, based on field observation; this road is seldom used and is therefore assumed to operate at LOS A (CH2M Hill 2007, p. 5.12-17).
- Sources of capacity and volume data for Yates Well Road and I-15 are: TRB 2000, COSB 2007b, and Caltrans 2007a, respectively.
- V/C = volume-to-capacity ratio;
- LOS = level of service

As indicated previously, northbound I-15 currently operates at LOS F on Friday afternoons. The proposed project would add 227 vehicles during construction to northbound I-15 on Friday afternoons, a time at which traffic on this road is already highly congested. Because of the high volume of existing vehicle traffic on this roadway at this time, the addition of project traffic would exacerbate existing congestion on I-15, particularly in the area of Yates Well Road. Therefore, project traffic would cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of I-15.

Because northbound I-15 is already highly congested on Friday afternoons, and project-related construction traffic would exacerbate congestion in the area of Yates Well Road, project impacts on northbound I-15 on Fridays would be considered direct, adverse impacts (CH2M Hill 2007, p. 5.12-16). Also, as discussed in Section 5, this would also be considered to contribute to an adverse cumulative impact on traffic. To limit the proposed project's direct and cumulative contribution to existing congestion on northbound I-15 on Friday afternoons, mitigation measure **TRANS-1** would require development of a traffic control plan that must include methods to substantially reduce the project's impact on I-15 traffic, such as staggering the departure of construction workers from the ISEGS site on Friday afternoons and/or establishing a carpool/vanpool incentive program. With proper implementation of the traffic control plan, project traffic accessing northbound I-15 from Yates Well Road would be distributed at sufficient intervals to reduce the congestive effect of project traffic along this segment of I-15 on Friday afternoons during construction (i.e. fewer cars would be attempting to merge into congested I-15 traffic from the Yates Well Road on-ramp at any given time).

Regarding existing levels of service, the addition of 243 vehicle trips to Yates Well Road would not result in a direct, adverse impact. However, because this road is primarily traveled by recreationists--people traveling to the Primm Valley Golf Club and to desert recreation activities such as photography, off-highway vehicle riding, and so forth—mitigation measure **TRANS-1** also requires adequate signage along Yates Well Road, as well as on the northbound and southbound I-15 off-ramps at Yates Well Road, to alert travelers to the presence of construction vehicles.

Additionally, construction truck traffic could result in unexpected damage to Yates Well Road and I-15 freeway ramps. Therefore, mitigation measure **TRANS-2** would require that any project construction-related damage to Yates Well Road or I-15 freeway ramps be repaired to their original condition, prior to the start of project construction.

Construction Workforce Parking and Laydown Area

The approximately 231 vehicles used to transport workers to the proposed project site during the peak construction period would park onsite. Private vehicles and busses would be parked at the approximately 377-acre laydown area at the project site (CH2M Hill 2007, p.5.12-17; CH2M Hill 2008b, p.5-1). Although the precise number of available parking spaces is unknown, using a conservative assumption of 12 feet by 25 feet of area for one parking space, the applicant would need an approximate area of at least 69,300 square feet (1.5 acres) to accommodate 192 private vehicles and 39 busses. The 377-acre laydown are would be more than adequate to park 231 vehicles.

Hazards Due to a Street Design Feature

Primary access to the ISEGS site would be from Colosseum Road, which runs through the Ivanpah 2 site. However, prior to construction, this road would be realigned to run between Ivanpah 1 and Ivanpah 2 (CH2M Hill 2007, p.5.12-17). The project site is comprised of mostly vacant desert land except for Colosseum Road and the electrical transmission line that traverses the site.

Most of the land surrounding the project site is unimproved with the exception of the two-lane unpaved Colosseum Road located adjacent to the site and the electrical transmission line (these features are located both on and adjacent to the project site). The entrance to the ISEGS site would be graded to dimensions to accommodate construction trucks; therefore, no impacts are expected to occur as a result of a street design feature.

Linear Facilities

The proposed project would use potable water from wells located at the northwest corner of the Ivanpah 1 site. Fire suppression water would be stored onsite in a raw water tank reserved for that purpose at each of the three power plants (CH2M Hill 2009a).

All process wastewater would be recycled in the system. Sanitary wastewater would be discharged into a septic system within the logistics area for the administration, operations and maintenance buildings. Portable toilets would be used at each of the three power plants. Therefore, because all water and wastewater pipelines would be constructed within the boundaries of the proposed ISEGS development, there would not be any traffic and transportation impacts resulting from these project linear facilities (CH2M Hill 2009a).

Natural gas would be supplied to the site through a new six-mile long distribution pipeline that would run along the perimeter of the Ivanpah 3 and Ivanpah 2 sites. The line would cross Colosseum Road. Additionally, an approximately 1.6-mile segment of this roadway would be rerouted through the project site (CH2M Hill 2009a). Construction activities related to pipeline construction and rerouting would temporarily preclude public use of Colosseum Road. The County of San Bernardino does not have any traffic counts (COSB 2007b) for this unpaved rural portion of Colosseum Road, which connects Yates Well Road to other unpaved rural roads. Traffic on this road has been observed by BLM to be extremely low to nonexistent; however, Colosseum Road can experience higher volume traffic for various recreation events and activities that occur in the vicinity. Measures included in mitigation measure **TRANS-1** would require that traffic on this roadway be rerouted through the use of detours to ensure continuous access to the areas serviced by Colosseum Road.

Ivanpah 1, 2, and 3 would be interconnected to the grid through a new Ivanpah Substation utilizing 115-kV generation tie lines within the ISEGS development. The project would include a 220-kV upgrade to Southern California Edison's existing 115-kV line passing through the site on a northeast-southwest right-of-way over a 36-mile section from the new Ivanpah Substation to the existing Eldorado Substation in Nevada. Ivanpah 1 would be connected to the substation with a 5,800-foot-long line; Ivanpah 2, through the substation with a 3,900-foot-long line; and Ivanpah 3 would be connected through the substation with a 14,100-foot-long line. Construction of the new Ivanpah Substation and the generation tie lines would all be within the ISEGS development and the upgrade to SCE's transmission line would be within the existing transmission right-of-way. Therefore, transmission line interconnection and upgrades would not require public road closure and would not affect traffic (CH2M Hill 2009a).

The proposed Ivanpah Substation would also require that new telecommunication infrastructure be installed to provide protective relay circuit and a SCADA circuit, together with data and telephone services. The telecommunication path from Ivanpah Substation to the local carrier facility interface at Mountain Pass area consists of approximately eight miles of fiber optic cable to be installed overhead on existing poles and through new underground conduits to be constructed in the substation and telecom carrier interface point. This fiber optic route consists of two segments. The first segment is from Ivanpah Substation to Mountain Pass Substation using the existing Nipton 33-kV distribution line poles built along the transmission line corridor that crosses between Ivanpah 1 and 2. The second segment is from Mountain Pass Substation to the telecommunications facility approximately 1.5 miles away at an interface point to be designated by the local telecommunication carrier. The fiber cable would be installed on the existing 12-kV distribution line poles. The construction of the telecommunication facilities within existing right-of-way of the distribution lines would not affect traffic (CH2M Hill 2009a).

Operations Impacts

Operation Workforce Traffic

The operational phase of the proposed project would require 90 employee commutes, or 180 daily trips. Thirty employees are required for the daytime shift. The remaining 60 employees work on the night time shift and would not travel during the peak hours (CH2M Hill 2007, p.5.12-17). However, it is assumed that the daytime workforce of 30 would travel from the Las Vegas area during the AM peak hours and to the Las Vegas area during the PM peak hours.

Thirty operational trips added to I-15 during peak hours would not represent a substantial increase in traffic volume and would not result in a direct, adverse impact Monday through Thursday. However, as indicated previously, northbound I-15 operates at LOS F on Friday afternoons and into the late evening. The number of project-related vehicles added to northbound I-15 on Friday afternoons would be minor compared to the number of vehicles traveling on northbound I-15 during the same time. However, because the project would exacerbate existing congestion on I-15 in the area of Yates Well Road, impacts from the project on northbound I-15 on Friday afternoons would be considered direct, adverse impacts. To limit the proposed project's direct impact and contribution to existing congestion on northbound I-15 on Friday afternoons, mitigation measure **TRANS-1** would require development of a traffic control plan that must include methods to substantially reduce the project's impact on traffic on I-15, such as staggering the departure of operational employees from the ISEGS site on Friday afternoons and/or establishing a carpool/vanpool incentive program.

Mitigation measure **TRANS-1** would reduce the impact from project operation-related traffic on northbound I-15. BLM consulted with Dan Kopulsky of Caltrans District 8 on the content of mitigation measure **TRANS-1**, and Mr. Kopulsky indicated that although the addition of any project-related trips would be considered adverse, the implementation of mitigation measure **TRANS-1** would reduce the impacts (Kopulsky 2008).

Operational employees would park in a parking lot provided at Ivanpah 1. The onsite parking is expected to be large enough to accommodate at least 60 vehicles; therefore, operation of the ISEGS is not expected to result in an inadequate parking capacity.

Glare

Glare is defined as difficulty seeing in the presence of bright light such as direct or reflected sunlight or other light. Glare is caused by a substantial ratio of luminance (brightness) between a field of view and the glare source. Because the proposed project involves the use of mirrors to direct reflected sunlight at power tower receivers, the potential exists for glare to be observed by motorists on adjacent roadways and aircraft pilots. The analysis below addresses two different aspects of glare from sunlight:

1. energy in consideration of human safety from the energy intensity that could be potentially absorbed by the retina, or in other words, the potential for light to

result in damage to the retina as evaluated in units of kilowatts per square meter (kw/m^2); and

2. luminance or brightness perceived by observers as evaluated in units of candelas per square meter (cd/m^2).

Energy and Safety

There are currently no regulations specific to light reflected from solar plants, however, potential safety effects of solar radiation from the proposed project have been analyzed within the context of principles and procedures developed for beam safety in the Solar 1 experimental plant at Daggett, California, as conducted by the Sandia National Laboratories (Sandia Report SAND83-8035 by T.D. Brumleve), which identified the following maximum permissible exposure (MPE) limits for reflected sunlight:

- MPE for momentary exposure (for a period of 0.25 second or less) is 10 kw/m2
- MPE for continuous exposure (for a period greater than 0.25 second) is 1 kw/m2 (LIA 2009)

Heliostat Energy and Safety

With regard to heliostat safety, the highest intensity of solar radiation that could be directly reflected from a single heliostat would occur at its focal distance of 500 meters and would be 3.125 kw/m^2 (CH2M Hill 2008g). Because this level of solar radiation is well below the MPE for momentary exposure of 10 kw/m^2, an observer, such as a motorist or pilot, would not experience retinal injury in the event of sunlight being directed away from the power tower receiver and reflected towards an observer as a momentary exposure. However, this solar radiation would exceed the MPE for continuous exposure of 1 kw/m^2, and the potential would exist for a person to experience injury if he or she stared directly into the reflected solar radiation without blinking or looking away.

It is important to note that the intensity of reflected light and solar radiation substantially diminishes as distance from the source increases. For example, at 1,000 meters from the heliostat, the highest intensity of solar radiation would be less than 1 kw/m^2 (CH2M Hill 2008g). Locations where an observer could potentially be exposed to solar radiation above the 1 kw/m^2 MPE for continuous exposure (should the heliostat(s) be directed to cause such an effect) would be from low-altitude aircraft passing over the project or when an observer is on foot or in a vehicle, in both cases within 1,000 meters of one or more heliostats.

During daylight hours, the heliostats would normally pivot within the range of the stowed position (mirrors facing vertically upwards) to the track position (various angles ranging from facing horizontally to nearly vertical). At night, the heliostats would normally be maintained in the stowed position. Approximately every 2 weeks, the heliostat would pivot from the stowed position to the wash position for night-time mirror washing (mirrors facing horizontally). Daily positioning of the heliostats would occur as follows:

1. At dawn, when likely all heliostats would be moved from stowed to track position to begin reflecting solar energy to the receiver/boiler;

2. During mid-day, when some heliostats would be returned to the stowed position to not exceed solar energy capacity limits of the receiver/boiler;
3. During late-afternoon or evening, when the stowed heliostats would be returned to track position to increase solar energy directed to the receiver/boiler as the sun's position begins to lower in the western horizon and be less optimal for energy production;
4. At nightfall, when all heliostats would be returned to the stowed position or to the wash position for mirror washing at a frequency of about once every two weeks.

The aiming control system of the heliostats uses optimization software to instruct the solar field controller where each heliostat should aim to maximize solar energy collection and output. The software accounts for the light flux intensity and distribution required for the four faces of the receiver/boiler and various other conditions such as sun radiation, wind, air pressure, and the number of heliostats available for tracking. When computing the optimal aiming policy, the control system factors in the differences between heliostats with respect to their tracking accuracy, the intensity of the beam they reflect, the shape of the beam and other relevant aspects. The applicant has indicated that the optimization software would also prevent the mirrors from being aimed toward the freeway or the Primm Valley Golf Course at an angle that would reflect sunlight near the ground surface (CH2M Hill 2009a).

Assuming all mirrors are returned to the stowed position (facing vertically upwards) before dawn, BLM has identified three circumstances under which an observer could potentially be exposed to reflected solar radiation from one or more heliostats, including:

1. **Energy Capacity Regulation**. During mid-day, when some heliostats would be returned to the stowed position to avoid exceeding the solar energy capacity limits of the receiver/boiler, which would result in the potential for sunlight to be reflected upward at angles that could be observed by pilots of aircraft flying over or past the site. Depending on the time of day at which a mirror is in the stow position and the orientation of the mirror, solar radiation could be reflected toward offsite site observers on roadways, in the airspace above the site, or at elevated positions on the ground (such as in foothills near the site);
2. **Technical Malfunction**. Solar radiation could be reflected offsite as a result of a technical malfunction if the mirror position was such that it would reflect sunlight toward an observer; and
3. **Maintenance**. During day-time maintenance if the heliostat was moved from the stowed to the wash position and passed momentarily through a position that would reflect sunlight to an observer.

In most cases, exposure to solar radiation reflected from heliostats would be momentary because the observers would most likely be in motion—traveling either by vehicle or aircraft. The applicant has indicated that in the event that a heliostat was not aimed at the receiver/boiler, never would more than one heliostat be aimed at a single location or angle in the sky (CH2M Hill 2009q). Circumstances when an observer at ground level may not be in motion and could be exposed to longer than momentary (continuous) reflection could occur when hikers are in the Clark Mountains, motorists on I-15 are stationary or moving slowly in congested traffic such as during Friday afternoons and evenings, or if an observer is hiking or on a local road in the vicinity of the project and within 1,000 meters. Should any of these potential exposure conditions occur at ground level, this reflected solar radiation would not be expected to exceed the MPE for continuous exposure of 1 kw/m^2, for hikers in the Clark Mountains and motorists on I-15, because they would be beyond 1,000 meters from the heliostat. If observers were on-foot or in a vehicle within 1,000 meters of heliostats that were misdirected, then they could be exposed to reflected solar radiation exceeding the MPE for continuous exposure. While the brightness of light reflected from heliostats would likely cause observers to avoid looking directly into the light for longer than a fraction of a second, it is not conclusive that personal reaction to bright light would adequately mitigate this risk of exposure that could cause retinal injury to one's eyes.

Circumstances when a viewer from an aircraft could be exposed to continuous reflected solar radiation at a level exceeding the continuous MPE threshold could occur when an aircraft is within 1,000 meters altitude above the heliostats and the solar radiation from a number of heliostats created a continuum of reflection in the sky, such as could occur with adjacent rows of heliostats all turned to the stowed position. Aircraft could fly as low as 1,350' (411 meters) above the ground surface, and thus there is potential for exceeding the threshold for continuous exposure. While the brightness of light reflected from heliostats would likely cause observers to avoid looking directly into the light for longer than a fraction of a second, like the potential exposure to observers on the ground, it is not conclusive that personal reaction of observers in an aircraft to bright light would adequately mitigate this risk of exposure that could cause retinal injury to one's eyes. In consideration of potential harmful and/or distractive exposure to observers on the ground and airborne and existing military flight paths and those planned with the development of the Southern Nevada Supplemental Airport near Jean, Nevada which would have flight paths over and near the ISEGS site, mitigation measure **TRANS-3** would require the applicant to prepare a Heliostat Positioning Plan that would accomplish the following:

1. Recognize potential sensitive receptors including observers in aircraft, motorists on I-15, hikers in the Clark Mountains and other hikers and motorists who could access locations closer to the project;
2. Identify the heliostat movements and positions that could result in reflected solar radiation from heliostats to be observed by these receptors;
3. Propose a Heliostat Operating Plan that would avoid potential for human health and safety hazards at locations of sensitive receptors including the potential for momentary and continuous solar radiation exposure to occur greater than the thresholds of significance of:
    a. MPE for momentary exposure (for a period of 0.25 second or less) is 10 kw/m2
    b. MPE for continuous exposure (for a period greater than 0.25 second) is 1 kw/m2

4. Develop a monitoring plan to verify any ISEGS operational impacts are not adverse, and if impacts are found or reported, that they are investigated and appropriate mitigation proposed and implemented. The monitoring plan should log, investigate and respond to complaints regarding glare; and
5. The monitoring plan should be coordinated with the FAA, U.S. Department of the Navy, CalTrans, and Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport and be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.

Power Tower Receiver

With regard to power tower receiver safety, the highest intensity of solar radiation expected to be reflected from a single power tower receiver at its surface would be as high as 688 kw/m^2. However, as noted above, the intensity of reflected light and solar radiation diminishes as distance from the source increases. Each tower on which each power tower receiver would be installed would be approximately 140 meters tall (459 feet). Each power tower receiver would be approximately 20 meters high, therefore the bottom of each power tower receiver would be located approximately 120 meters (394 feet) from the ground surface. As shown below in **Table 4.11-7**, the intensity of energy reflected from the power tower receiver as experienced at the ground surface (120 meters below) would be approximately 0.048, which is well below the 10 kw/m^2 and 1 kw/m^2 MPEs for momentary and continuous exposure, respectively. Therefore, solar radiation reflected from project power tower receivers is not expected to pose a health and safety hazard to motorists on adjacent roadways, as they would be located even farther from the light source and would experience even lower levels of solar radiation. Additionally, with implementation of mitigation measure **TRANS-6**, as described below under hazards to Hazards to Air Navigation, aircraft flying over the project site would be required to fly at least 1,350 feet (411 meters) above the ground surface, which would be approximately 900 feet (274 meters) above the power tower receiver. Therefore, as shown in **Table 4.11-7**, the intensity of solar radiation expected to be experienced by pilots flying over the project site attributable to the power tower receivers would be approximately 0.009 kw/m^2, which is well below the MPEs for momentary and continuous exposure. Therefore, solar radiation reflected from project power tower receivers is not expected to pose a health and safety hazard to pilots or passengers in aircraft flying over the site.

Table 4.11-7
Energy Reflected from ISEGS Power Tower Receivers

Distance from Receiver		Intensity of Reflected Light	
Meters	Feet	w/m2	kw/m2
1	3.3	687,550	687.5
5	16.4	27,502	27.5
10	32.8	6,875	6.88
50	164	275	0.28
100	328	68.8	0.069
120	393	47.8	0.048
140	459	35.1	0.035
150	492	30.6	0.031
200	656	17.2	0.017
250	820	11.0	0.011
274	900	9.2	0.009
500	1,640	2.8	0.003
1,000	3,280	0.69	0.0007

Calculations based on information presented in CH2M Hill 2009j, CH2M Hill 2009r.

Luminance and Brightness

There are currently no regulations that are directly applicable to brightness from facilities such as solar plants, however, the Illuminating Engineering Society of North America Recommended Practice for Roadway Sign Lighting includes standards for lighting of roadway signs. The recommended maintained level of lighted roadway signs is 44 to 89 cd/m^2 (IESNA 2001). With regard to aircraft pilots, the FAA does not evaluate the potential for glare from proposed projects to affect aircraft (FAA 2009).

The luminance of several common objects is provided in **Table 4.11-8** for reference.

Table 4.11-8
Luminance of Common Objects

Object	Luminance (cd/m²)
Sun	1.6 billion
100-watt lamp	47,000
Compact fluorescent lamp	30,000
Candle flame	10,000
Daylight sky	8,000
Moonlight	2,500

The brightness of reflected light at the surface of a single heliostat would be approximately 1.34 billion cd/m2 (CH2M Hill 2009r). Under operating conditions most heliostats would be positioned such that the light reflected from them would be concentrated directly at the power tower receivers. However, as discussed above, BLM has identified three circumstances under which an observer could potentially be exposed to light reflected from one or more heliostats. These observers include pilots and passengers of aircraft flying over or near the site, motorists on I-15, hikers in the Clark Mountains and other hikers and motorists who could access locations closer to the project.

The highest intensity of luminance expected to be reflected from a single heliostat, at its surface, would be 1.34 billion cd/m2 (CH2M Hill 2009r). In the event of heliostat repositioning or malfunction that resulted in sunlight being directed away from the power tower receiver and into the sky, the luminance of light reflected from a single heliostat as seen by an aircraft flying over the site at a distance of at least 370 meters would be as high as 35 million cd/m2, or approximately 2% of the brightness of the sun. This level of brightness would be extremely bright and would be temporarily blinding when viewed directly. On one hand, it could be rationalized that the potential for glare from heliostats to pose a hazard to navigation of vehicles on adjacent roadways or air traffic flying above or adjacent to the site would not be adverse because:

- viewers of such glare would instinctively divert their eyes from the source;
- the duration of exposure may be very short because light would be reflected at a constant stationary angle and the viewer (motorist or pilot) would be traveling at a high rate of speed (the changing altitude of departing or arriving aircraft at the Southern Nevada Supplemental Airport would also severely limit the potential for any potential exposure to pilots); and
- glare that is bright enough to temporarily impair vision and cause viewers to look away is a common occurrence from other objects in the built and natural environment (such as lakes, building windows, and reflective surfaces such as mirrors and windows on other roadway vehicles).

However, it is not conclusive that personal reaction to bright light would adequately mitigate this risk of exposure that could cause temporary blindness and compromise safety of an observer who may be responsible to navigate an aircraft or vehicle. Therefore, mitigation measure **TRANS-3** would require the applicant to prepare a Heliostat Positioning Plan in order to avoid the potential risk to human health and safety.

Brightness of light reflected at the surface of each power tower receiver would be approximately 555,000 cd/m^2 (CH2M Hill 2009r). As described above, the intensity of solar energy and brightness diminishes as distance from the source increases. **Table 4.11-9** presents the intensity of brightness of light reflected from the power tower receivers at different distances from a power tower receiver. To provide a frame of reference, this table also includes the intensity of brightness of light produced by a 100-watt light bulb as viewed from different distances.

Table 4.11-9
Brightness of Light Reflected from ISEGS Power Tower Receivers

Distance		**Luminance (cd/m2)**	
Meters	**Feet**	**Receivers**	**100-watt Bulb**
1	3.3	555,000	47,000
5	16.4	22,200	1,880
10	32.8	5,550	470
35	115	453	38.4
50	164	222	18.8
100	328	55.5	4.70
120	394	38.54	3.26
140	459	28.32	2.40
150	492	24.67	2.09
200	656	13.88	1.18
250	820	8.88	0.75
274	899	7.39	0.63
500	1,640	2.22	0.19
1,000	3,281	0.56	0.047
1,448	4,751	0.26	0.02

Calculations based on information presented in CH2M Hill 2009j, CH2M Hill 2009r.

Roadway Traffic

As shown above and shown in **Table 4.11-9**, the intensity of reflected light diminishes as distance from the source increases. Because the power tower receiver would be located approximately 120 meters (394 feet) from the ground surface, the intensity of brightness that would be experienced by receptors on the ground at the base of the tower would be approximately 38 cd/m^2. This level of brightness is below the standard range of 44 to 89 cd/m^2 for externally lighted roadway signs (as recommended in the Recommended Practice for Roadway Sign Lighting by the IESNA Sign Lighting Subcommittee) and is equivalent to the brightness of a 100-watt light bulb as viewed from a distance of 35 meters (115 feet). Therefore, the brightness of reflected light from project power tower receivers is not expected to cause temporary blindness or cause retinal damage to motorists on adjacent roadways, as they would be located even farther from the light source and would experience even lower levels of reflected brightness. Specifically, the highest intensity luminance expected to be experienced by drivers on adjacent roadways, including Colosseum Road, Yates Well Road, and I-15 would be less than 38 cd/m^2, which is the same brightness experienced from viewing a 100-watt light bulb from a distance of 35 meters (115 feet).

While the brightness associated with the power tower receivers, and brightness associated with the heliostats if mitigation measure **TRANS-3** is implemented, would not cause temporary blindness or retinal damage to motorists or observers from aircraft, specular reflections from the heliostats and diffuse reflections associated with the receivers would certainly be bright enough, and in an unexpected location, so that some observers could be distracted in trying to identify their source. This is not likely to be a safety issue on Colosseum Road, where drivers could slow and stop, but may create a hazard on I-15 due to the high speed of vehicles on that roadway. Because the light reflected from seven 459-foot power towers and the potential reflections from heliostats would be a feature that is out of context in this mostly natural desert setting (with the exception of nearby casinos, commercial businesses, amusement facilities, and billboards), the potential level of distraction to motorists on I-15 is expected to be higher than that of other man-made features in the vicinity. Drivers would expect to see the sun setting or rising on the horizon, but they would not expect to see bright glare off tall towers or mirrors in the desert. Mitigation measure **TRANS-4** would require verification after commercial operation that power tower receiver luminance does not exceed 89 cd/m^2 at the nearest receptor, to require monitoring over the life of the project to verify that the power tower receiver materials are maintained so as to not exceed this threshold, and to establish a process for complaint processing and resolution.

Air Traffic

With regard to air traffic, with implementation of mitigation measure **TRANS-6** (as described below under hazards to Hazards to Air Navigation), aircraft flying over the project site would be required to fly at least 1,350 feet (411 meters) above the ground surface, which would be approximately 900 feet (274 meters) above the power tower receiver. Therefore, as shown in **Table 4.11-9**, the brightness of light reflected from the power tower receivers expected to be experienced by pilots flying over the project site would be approximately 7.39 cd/m^2. This level of brightness is equivalent to that of a 100-watt light bulb as viewed from a distance of 80 meters (262 feet). Therefore, brightness of reflected light from project power tower receivers is not expected to pose a safety hazard to pilots of aircraft flying over the site.

The Applicant has provided data and analysis with respect to the expected intensity of energy and luminance of reflected light from the ISEGS project and BLM has independently verified the accuracy of the calculations provided and does not disagree with the assumptions provided. However, because of the technology proposed at the ISEGS site is relatively new and has never been implemented at this scale, mitigation measure **TRANS-4** would ensure that upon operation of the ISEGS, brightness would not result in a safety hazard to motorists on nearby roadways and pilots of aircraft flying over the site. **TRANS-4** would require measurements to verify luminance does not exceed 89 cd/m^2 at any of the nearest roads and power plant boundaries to each north, south, east and west face of each power tower for Ivanpah 1, 2 and 3 power plants. Measurements at these locations would verify that public exposure to brightness of light reflected from the power towers does not exceed the established limit as applicable to motorists.

Obstruction Hazards

FAA Regulations, Part 77, Section 77.13(a)(1), require that objects greater than 200 feet tall from the ground surface constructed within three miles of an airport with a runway of more than 3,200 feet in length may present an obstruction hazard to aircraft. Furthermore, obstruction standards presented in 14 CFR 77.25 affecting navigable air space state that an object may present a hazard to air navigation if it penetrates the horizontal departure surface from a distance of 10,000 feet at a slope of 50 to 1 with an additional 40,000 feet at a slope of 40 to 1. The ISEGS would require construction of seven power towers to a height of 469 feet above the ground surface.

No existing airports are located within three miles of the proposed project site. However, one runway of the proposed Southern Nevada Supplemental Airport, that if constructed would be located northeast of ISEGS, is proposed to be located approximately 40,000 feet from the ISEGS site. Therefore, in May 2008, the applicant submitted FAA Form 7460-1 (Notice of Proposed Construction or Alteration) to the FAA. **Table 4.11-10** includes information about FAA's review of project towers.

Table 4.11-10
Status of FAA Review of Form 7460-1

Tower Number	Location	Aeronautical Study No.[1]	FAA Determination
Power Tower 1	Ivanpah 1	2008-AWP-3209-OE	No Hazard to Navigation
Power Tower 2	Ivanpah 2	2008-AWP-3210-OE	No Hazard to Navigation
Power Tower 3	Ivanpah 3	2008-AWP-3211-OE	No Hazard to Navigation
Power Tower 4	Ivanpah 3	2008-AWP-3212-OE	No Hazard to Navigation
Power Tower 5	Ivanpah 3	2008-AWP-3213-OE	No Hazard to Navigation
Power Tower 6	Ivanpah 3	2008-AWP-3214-OE	No Hazard to Navigation
Power Tower 7	Ivanpah 3	2008-AWP-3215-OE	No Hazard to Navigation

[1] Source: Determinations downloaded from https://www.oeaaa.faa.gov/oeaaa/external/portal.jsp, accessed September 9, 2008.
[2] Determination is based upon standardized, non-project specific analysis. Applicant has requested that the FAA initiate project specific analysis (CH2M Hill 2008g).

As included in **Table 4.11-10,** the FAA has determined that none of the seven towers would present a hazard to navigation to aircraft from the proposed Southern Nevada Supplemental Airport. Although Power Tower 1 received a determination of no hazard to navigation, it was identified to be within the flight path of Instrument Route 213 (IR-213), a U.S. Navy training flight route (FAA 2008). However, the U.S. Navy has confirmed that construction of Power Tower 1 would not impose an adverse impact to IR-213, and that the Department of the Navy has no objection to the construction (Thompson 2008).

The FAA Determination for each tower includes a recommendation that each tower be marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K. To ensure that each tower is marked with appropriate lighting, mitigation measure **TRANS-5** would require the applicant to implement all FAA recommendations regarding structure lighting for Power Towers 1 through 7.

Thermal Plumes

When the ISEGS is operating, heat exhaust from the ACCs would have the potential to cause turbulence to low flying aircraft. The intensity of turbulence produced by an ACC is a function of wind speed, solar radiation, and ambient temperature and would therefore vary depending on these conditions. Turbulence intensity would peak during calm or low wind conditions and would not occur at night when the ACC is not in operation. The thermal radiation from the collector tower would be a small fraction of the magnitude of the thermal exhaust from the ACC and it is not considered to provide a thermal source of enough intensity to cause noticeable thermal turbulence impacts to low flying aircraft.

A small aircraft would be subject to potential disruption (i.e. turbulence) from a thermal plume with an average plume velocity of 4.3 m/s or higher (CASA 2004), where the peak velocity is twice the calculated plume average velocity. The velocity of thermal plumes generated by the air cooled condensers at the ISEGS site was calculated based on equations presented in a technical paper (Best 2003) to estimate the worst-case plume vertical velocities. The worst-case ACC operating conditions for the three ACCs were derived from heat balance data available in the AFC (CH2M Hill 2007) and other operating variables (exhaust velocity/temperature increase) are based on BLM's experience from other projects. The peak height for thermal plume average velocities of 4.3 m/s for the 200 MW generating area ACC at Ivanpah 3 and the 100 MW generating area ACCs at Ivanpah 1 and 2 would be approximately 1,350 feet and 900 feet, respectively. Therefore, aircraft flying directly over the Ivanpah 3 ACC would have the potential to experience turbulence at an altitude of 1,350 feet or less and aircraft flying directly over either of the Ivanpah 1 or 2 ACCs would have the potential to experience turbulence at an altitude of 900 feet or less.

To ensure that thermal plumes associated with ISEGS operation do not impact aviation activities within the navigable airspace above the site, mitigation measure **TRANS-6** would require the applicant to coordinate with the FAA to: 1) notify all pilots using the airspace above ISEGS of potential turbulence from thermal plumes, 2) update all applicable airspace charts to indicate that plume hazards could exist up to an altitude of 1,350 feet above the ground surface, and 3) require pilots to avoid direct overflight of the ISEGS site at or below this altitude during daylight hours.

Therefore, because implementation of this measure would ensure pilots using the airspace above the ISEGS site would be notified to avoid direct overflight of the ISEGS site at or below 1,350 feet during daylight hours, no direct, adverse impacts would be expected.

Emergency Services Vehicle Access

The SBCFD Station No. 53 in Baker, CA would provide service to the proposed project site. Station No. 53 is located approximately 45 miles from the project site and is staffed by three personnel including a full-time Captain and two paid-call firefighters (PCFs), who are supported as needed by other PCFs who live in the local area (SBCFD 2008).

In the event of an emergency at the proposed project site, emergency vehicles would enter the project site via Colosseum Road. Based on the proposed site plan, emergency services vehicle access is adequate.

Transportation of Hazardous Materials

Operation of the ISEGS would result in transportation of hazardous materials. BLM has addressed this issue in section 4.5 of this EIS. As presented in that section, during construction and operation of ISEGS, minimal amounts and types of hazardous materials (paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, 20 percent sulfuric acid, 30% sodium hydroxide, and welding gases in standard-sized cylinders) do not pose a risk of either spills or public impacts along any transportation route. BLM therefore does not recommend a specific route.

Although the transportation and handling of hazardous materials can increase roadway hazard potential, impacts associated with the hazardous materials can be mitigated by compliance with existing federal and state standards established to regulate the transportation of hazardous substances. These standards constitute a comprehensive regulatory program whose purpose is to ensure the safety of hazardous materials transportation. BLM has assessed the efficacy of these standards and finds that they are successful in minimizing the risks associated with hazardous materials transportation. The applicant stated that delivery of hazardous materials will comply with Caltrans, CHP, and California Vehicle Code (CVC) (CH2M Hill 2007, p. 5.12-18).

Specific sections of the CVC and the California Streets and Highways Code ensure that the transportation and handling of hazardous materials is done in a manner that protects public safety. Enforcement of these statutes is under the jurisdiction of the CHP.

The California Department of Motor Vehicles specifically licenses all drivers who carry hazardous materials. Drivers are required to check weight limits and conduct periodic brake inspections. Commercial truck operators handling hazardous materials are required to take instruction in first aid and procedures on handling hazardous waste spills. Drivers transporting hazardous waste are required to carry a manifest, which is available for review by the CHP at inspection stations along major highways and interstates.

The applicant would be required to comply with all laws and regulations governing the transport, storage, and use of hazardous materials. For a more detailed discussion on the handling and disposal of hazardous substances, see section 4.5.

Closure/Decommissioning Impacts

Following the operational life of 50 years, the project owner would close and decommission the project. Closure of the ISEGS would require a number of worker vehicle trips and truck haul trips to dismantle and haul project infrastructure from the ISEGS site. While the number of workers is unknown at this point, the number of haul trips would likely be similar to that of construction of the project. It is also likely that due to expected growth and development in the project area and in Las Vegas, that the level of service on I-15 would be lower than current conditions. As such, it is reasonable to expect that impacts to the local and regional and transportation system as a result of decommissioning of the ISEGS would be similar to those related to construction of the ISEGS. Specifically, vehicle and truck traffic related to decommissioning would likely exacerbate existing congestion in I-15 on Friday afternoons, would substantially increase the volume of traffic on roadways and intersections in the vicinity of recreation resources, and would have the potential to result in unexpected damage to Yates Well Road and I-15 freeway ramps. However with implementation of mitigation measures **TRANS-1** through **TRANS-5**, no direct adverse impacts would be expected to occur.

Beneficial Impacts

Neither the applicant nor BLM has identified any traffic-related benefits associated with the ISEGS.

4.11.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

The construction impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with the increase in traffic on local roads, especially Interstate 15, from construction workers and delivery vehicles. For the proposed project, the increase in traffic would not increase the LOS on Interstate 15, except for on Friday afternoons. On Friday afternoons, the increase in LOS would cause a direct adverse impact on traffic.

The construction of the Mitigated Ivanpah 3 Alternative would include approximately the same number of workers and deliveries as the proposed project. Therefore, the direct impacts identified in the DEIS for the proposed project would be the same for both alternatives. However, the duration of the impact associated with the construction period would be reduced by 8 months, or approximately 17 percent. The Traffic Control Plan required in mitigation measure **TRANS-1** for the proposed project would be equally effective for the Mitigated Ivanpah 3 Alternative.

Operations Impacts

Similar to construction impacts, the operation of the proposed project would result in a direct adverse impact to traffic on Interstate 15 on Friday afternoons. The operation of the Mitigated Ivanpah 3 Alternative would include approximately the same number of workers and deliveries as the proposed project. Therefore, the direct impacts identified for the proposed project would be the same for both alternatives. The Traffic Control Plan required in mitigation measure **TRANS-1** for the proposed project would be equally effective for the Mitigated Ivanpah 3 Alternative during operations.

With respect to potential safety impacts from glare, the proposed project would not result in brightness levels that could produce a safety hazard. However, the issue of distraction caused by glare from the facility is more difficult to predict, and mitigation measure **TRANS-4** would require monitoring of brightness levels, and complaints received from pilots and/or drivers.

Although the glare distraction effect from the proposed project could not be predicted, the effect from the Mitigated Ivanpah 3 Alternative would be anticipated to be lower than that for the proposed project due to the reduced number of power tower receivers. Overall, the distance of the power towers and heliostats to the highway would be the same for both alternatives, and the brightness of the power tower receivers would be similar. However, in the case of Ivanpah Unit 3, there would only be one power tower receiver, as opposed to five under the proposed project. This reduction in the number of power tower receivers would be expected to reduce any potential distraction effect, should it exist.

Closure/Decommissioning Impacts

The closure and decommissioning impacts of the Mitigated Ivanpah 3 Alternative would be lower than those identified for construction, but would exceed those associated with operations. Closure and decommissioning would require an increase in the number of workers, so the number of commuting trips would be higher than during operations. However, the number of commuting workers would not reach the level associated with construction. Although decommissioning would not involve extensive delivery of materials, it would involve extensive removal of materials from the site, adding to potential impacts to traffic on Interstate 15.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with traffic and transportation.

4.11.2.3 Modified I-15 Alternative

Construction Impacts

The construction impacts resulting from the Modified I-15 Alternative would be associated with the increase in traffic on local roads, especially Interstate 15, from construction workers and delivery vehicles. For the proposed project, the increase in traffic would not increase the LOS on Interstate 15, except for on Friday afternoons. On Friday afternoons, the increase in LOS would cause a direct adverse impact on traffic.

The construction of the Modified I-15 Alternative would include approximately the same number of workers and deliveries as the proposed project. Therefore, the direct impacts identified in the DEIS for the proposed project would be the same for both alternatives. However, the duration of the impact associated with the construction period would be reduced by 8 months, or approximately 17 percent. The Traffic Control Plan required in mitigation measure **TRANS-1** for the proposed project would be equally effective for the Modified I-15 Alternative.

Operations Impacts

Similar to construction impacts, the operation of the proposed project would result in a direct adverse impact to traffic on Interstate 15 on Friday afternoons. The operation of the Modified I-15 Alternative would include approximately the same number of workers and deliveries as the proposed project. Therefore, the direct impacts identified for the proposed project would be the same for both alternatives. The Traffic Control Plan required in mitigation measure **TRANS-1** for the proposed project would be equally effective for the Modified I-15 Alternative during operations.

With respect to potential safety impacts from glare, the proposed project would not result in brightness levels that could produce a safety hazard. However, the issue of distraction caused by glare from the facility is more difficult to predict, and mitigation measure **TRANS-4** would require monitoring of brightness levels, and complaints received from pilots and/or drivers.

The potential glare distraction effect from the Modified I-15 Alternative, like that from the proposed project, is difficult to predict. With respect to the number of potential glare sources, the number of power tower receivers in the Modified I-15 Alternative would be reduced from seven to three, thus reducing the number of glare sources. However, the power tower receiver associated with Ivanpah Unit 3 would be located much closer to Interstate 15 in the Modified I-15 Alternative. In the proposed project, the closest power tower receiver to Interstate 15 is that in Ivanpah Unit 1. The Ivanpah Unit 1 power tower would be located approximately 8,400 feet (1.6 miles) from Interstate 15 in the proposed project. In contrast, the Ivanpah Unit 3 power tower receiver would be located approximately 4,800 feet (0.9 miles) from Interstate 15 in the Modified I-15 Alternative. Therefore, although the number of potential glare sources would be reduced, one of the sources would be located much closer to interstate 15, and thus may present an increased potential glare distraction effect.

Closure/Decommissioning Impacts

The closure and decommissioning impacts of the Modified I-15 Alternative would be lower than those identified for construction, but would exceed those associated with operations. Closure and decommissioning would require an increase in the number of workers, so the number of commuting trips would be higher than during operations. However, the number of commuting workers would not reach the level associated with construction. Although decommissioning would not involve extensive delivery of materials, it would involve extensive removal of materials from the site, adding to potential impacts to traffic on Interstate 15.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with traffic and transportation.

4.11.2.4 No Action

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan. The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and could include consideration of another solar project.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

4.11.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

Table 4.11-11 provides a general description of applicable statutes, regulations, and standards adopted by the federal government, the State of California, and San Bernardino County pertaining to traffic and transportation with which the project is required to comply. Mitigation measures would ensure project consistency with a law or regulation where it was not already mandated by federal or state regulations.

Table 4.11-11
Project Compliance with Adopted Traffic and Transportation Laws and Regulations

Applicable Law	Description and Project Compliance Assessment
Federal	
Code of Federal Regulations, Title 14, section 77 (14 CFR 77)	Includes standards for determining physical obstructions to navigable airspace. Sets forth requirements for notice to the Federal Aviation Administration of certain proposed construction or alteration. Also provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace (including temporary flight restrictions). The FAA has conducted aeronautical studies for all project structures which exceed 200 feet in height and has determined that construction of these structures, if properly lighted, would not present a hazard to aircraft. Implementation of mitigation measure **TRANS-5** would ensure that that each power tower is marked and lighted according to the recommendations included in the FAA aeronautical study. Therefore the proposed project would comply with FAA regulations.
CFR, Title 49, Subtitle B	Includes procedures and regulations pertaining to interstate and intrastate transport (includes hazardous materials program procedures) and specifies safety measures for motor carriers and motor vehicles that operate on public highways. Enforcement is conducted by state and local law enforcement agencies and through state agency licensing and ministerial permitting (e.g., California Department of Motor Vehicles licensing, Caltrans permits), and/or local agency permitting.
State	
California Vehicle Code, Division 2, Chapter. 2.5; Div. 6, Chap. 7; Div. 13, Chap. 5; Div. 14.1, Chap. 1 & 2; Div. 14.8; Div. 15	Includes regulations pertaining to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and the transportation of hazardous materials. Enforcement is provided by state and local law enforcement agencies and through ministerial state agency licensing and permitting and/or local agency permitting.
California Streets and Highway Code, Division 1 & 2, Chapter 3 & Chapter 5.5	Includes regulations for the care and protection of state and county highways and provisions for the issuance of written permits. Enforcement is provided by state and local law enforcement and through ministerial state agency licensing and permitting and/or local agency permitting.

Applicable Law	Description and Project Compliance Assessment
	Local
SANBAG Regional Transportation Plan	Identifies public policies and strategies for the transportation system in the San Bernardino County region. Enforcement is provided by CHP, local law enforcement, and through ministerial state agency licensing and permitting and/or local agency permitting.
SANBAG CMP	Requires maintenance of LOS E or better on CMP segments. Although it would contribute to an existing LOS F condition on I-15 on Friday afternoons, the ISEGS project would not cause any CMP segment to exceed minimum LOS E standards.
San Bernardino General Plan	Establishes regional transportation objectives, policies, and implementation measures for various modes of transportation. Project construction and operation traffic would comply with the general plan because the project would not cause LOS to drop below the County of San Bernardino's minimum criteria of LOS C.
San Bernardino County Code Title 5 Division 1 Highway Permit	Addresses permitting issues for oversize/overweight vehicles. Enforcement is provided by CHP, local law enforcement, and through ministerial state agency licensing and permitting and/or local agency permitting.

4.11.4 Mitigation Measures

Traffic Control Plan

TRANS-1 Prior to start of construction of the ISEGS, the project owner shall prepare and implement a Traffic Control Plan (TCP) for ISEGS construction and operation traffic. The TCP shall address the movement of workers, vehicles, and materials, including arrival and departure schedules, and designated workforce and delivery routes.

The project owner shall consult with the County of San Bernardino and the Caltrans District 8 office in the preparation and implementation of the Traffic Control Plan and shall submit the proposed Traffic Control Plan to the County of San Bernardino and the Caltrans District 8 office in sufficient time for review and comment and to BLM's Authorized Officer and the CPM for review and approval prior to the proposed start of construction and implementation of the plan. BLM's Authorized Officer and the CPM shall review and approve the TCP or identify any material deficiencies within thirty (30) days of receipt. The project owner shall provide a copy of any written comments from the County of San Bernardino and the Caltrans District 8 office and any changes to the Traffic Control Plan to BLM's Authorized Officer and the CPM prior to the proposed start of construction.

Verification: At least 90 calendar days prior to the start of construction, including any grading or site remediation on the power plant site or its associated easements, the project owner shall submit the proposed traffic control plan to the County of San Bernardino and the Caltrans District 8 office for review and comment and to BLM's

Authorized Officer and the CPM for review and approval. The project owner shall also provide BLM's Authorized Officer and the CPM with a copy of the transmittal letter to the County of San Bernardino and the Caltrans District 8 office requesting review and comment.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from either the County of San Bernardino and the Caltrans District 8 office, along with any changes to the proposed traffic control plan to BLM's Authorized Officer and the CPM for review and approval.

The Traffic Control Control Plan shall include:

- providing an incentive program to encourage construction workers to use van or bus service;
- limiting truck deliveries to the project site on Fridays to mornings only so they occur before 12:00 noon;
- redirection of construction traffic with a flag person as necessary to ensure traffic safety and minimize interruptions to non-construction related traffic flow;
- signage, lighting, and traffic control device placement at the project construction site and laydown areas;
- signage along eastbound and westbound Yates Well Road and at the entrance of each of the I-15 northbound and southbound off-ramps at Yates Well Road notifying drivers of construction traffic throughout the duration of the construction period;
- signage and detours to redirect traffic from Colosseum Road during construction activities related to roadway realignment and pipeline installation in and across the Colosseum Road right of way;
- a Heavy Haul Plan addressing the transport and delivery of heavy and oversized loads requiring permits from Caltrans or other state and federal agencies;
- a work schedule and end-of-shift departure plan will be implemented to limit Friday departures from the site, traveling north to Las Vegas, to 12 or fewer vehicles every three minutes between 12:00 noon and 10:00 PM.

Repair of Public Right-of-Way

TRANS-2 The project owner shall restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities to original or near-original condition in a timely manner, as directed by the BLM's Authorized Officer and the CPM. The project owner's use of Yates Well Road shall not diminish the rights or use of the road by other BLM authorized users. Repairs and restoration of access roads may be required at any time during the construction phase of the project to assure safe ingress and egress.

Prior to the start of site mobilization, the project owner shall consult with the County of San Bernardino and Caltrans District 8 and notify them of the proposed schedule for project construction. The purpose of this notification is to request that the County of San Bernardino and Caltrans consider postponement of public right-of-way repair or improvement activities in areas affected by project construction until construction is completed and to coordinate with the project owner regarding any concurrent construction-related activities that are planned or in progress and cannot be postponed.

Verification: At least 30 days prior to the start of mobilization, the project owner shall photograph or videotape all affected public roads, easements, and right-of-way segment(s) and/or intersections and shall provide BLM's Authorized Officer, the CPM, the affected local jurisdiction(s), and Caltrans (if applicable) with a copy of these images. The project owner shall rebuild, repair and maintain all public roads, easements, rights-of-way in a usable condition throughout the construction phase of the project.

Prior to the start of site mobilization, the project owner shall consult with the County of San Bernardino and Caltrans District 8 and notify them of the proposed schedule for project construction. The purpose of this notification is to request that the County of San Bernardino and Caltrans consider postponement of public ROW repair or improvement activities in areas affected by project construction until construction is completed and to coordinate with the project owner regarding any concurrent construction-related activities that are planned or in progress and cannot be postponed.

Within 60 calendar days after completion of construction, the project owner shall meet with BLM's Authorized Officer and the CPM, the County of San Bernardino and Caltrans District 8 to identify sections of public right-of-way to be repaired. At that time, the project owner shall establish a schedule to complete the repairs and to receive approval for the action(s). Following completion of any public right-of-way repairs, the project owner shall provide a letter signed by the County of San Bernardino and Caltrans District 8 stating their satisfaction with the repairs to BLM's Authorized Officer and the CPM.

Heliostat Positioning Plan and Monitoring

TRANS-3 The project owner shall prepare a Heliostat Positioning Plan that would avoid potential for human health and safety hazards from solar radiation exposure.

Verification: Within 90 days before commercial operation of any of the three ISEGS power plants, the project owner shall submit the Heliostat Positioning Plan to BLM's Authorized Officer and the CPM for review and approval. The project owner shall also submit the plan to CalTrans, FAA, San Bernardino County, the San Bernardino Associated Governments (the transportation planning agency for San Bernardino County), and the Clark County Department of Aviation for review and comment and forward any comments received to BLM's Authorized Officer and the CPM. The Heliostat Positioning Plan shall accomplish the following:

1. Identify the heliostat movements and positions (including reasonably possible malfunctions) that could result in potential exposure of observers at various locations including in aircraft, motorists, pedestrians and hikers in the Clark Mountains to reflected solar radiation from heliostats;

2. Describe within the HPP how programmed heliostat operation would avoid potential for human health and safety hazards at locations of observers as attributable to momentary solar radiation exposure greater than the Maximum Permissible Exposure of 10 kw/m^2 (for a period of 0.25 second or less).
3. Prepare a monitoring plan that would: a) obtain field measurements in response to legitimate complaints; b) verify that the Heliostat Positioning Plan would avoid potential for human health and safety hazards including temporary or permanent blindness at locations of observers; and c) provide requirements and procedures to document, investigate and resolve legitimate complaints regarding glare.
4. The monitoring plan should be coordinated with the FAA, U.S. Department of the Navy, CalTrans, CHP, and Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport and be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.

Verification of Power Tower Receiver Luminance and Monitoring

TRANS-4 The project owner shall prepare a Power Tower Luminance Monitoring Plan to provide procedures to conduct periodic monitoring and to document, investigate and resolve complaints regarding distraction effects to aviation, vehicular and pedestrian traffic associated with the power towers.

Verification: Within 60 days prior to commercial operation of the first ISEGS power plant to become operational, the project owner shall provide a Power Tower Luminance Monitoring Plan applicable for the ISEGS Project for review and approval by BLM's Authorized Officer and the CPM. The plan shall specify procedures to document, investigate and resolve complaints regarding glare, and report these to BLM's Authorized Officer and the CPM within 10 days of receiving a complaint.

The project owner shall evaluate the effects of the intensity of the luminance of light reflected from the power tower receivers for the following scenarios:

A. Within 90 days following commercial operation;
B. After the initial 5 years of operation;
C. If a major design change is implemented that results in an increase of the reflective luminance of the power tower for each of the three ISEGS power plants (Ivanpah 1, 2 and 3); and
D. After receiving a legitimate complaint regarding a distraction associated with the power towers.

The Power Tower Luminance Monitoring Plan shall include provisions for the following:

1. Coordination of luminance evaluations with the FAA, U.S. Department of the Navy, CalTrans, CHP, and with Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport;
2. Reporting within 30 days after completing luminance measurements required under this plan; the project owner shall submit a summary report to FAA, U.S. Department of the Navy, CalTrans, San Bernardino County, SANBAG, CHP and

Clark County Department of Aviation for review and comment, and to BLM's Authorized Officer and the CPM for review and approval.

3. Measurement of luminance at the locations where any distraction effects have been reported and at the locations nearest the power towers from the four sides of the power plant boundaries, and the nearest public road~~s~~, which may be substituted for one of the sides of the power tower of each of the three power plants during the time of day when values would be highest;
4. Measurement of luminance using an illuminance meter, photometer, or similar device and reporting of data in photometric units; the measurements are intended to provide a relative and quantifiable measure of luminance that can be associated with any observed and reported distraction effect from the power tower receivers that may support anticipation and investigation of any future effects.
5. Provisions for identifying and implementing appropriate mitigation measures if reported distraction is determined to be legitimate and if power tower luminance is determined to be causing a safety concern; The project owner shall consider and propose any reasonable mitigation measures that are technically and financially feasible. The mitigation measures may include surface treatment or material changes to increase absorption and reduce reflectivity of the power tower receivers, road signage, screening or other reasonable measures.
6. Post-mitigation verification; Within 30 days following the implementation of mitigation measures designed to reduce reflectivity of the power towers, the project owner shall repeat the luminance measurements to demonstrate the effectiveness of mitigation measures and prepare a supplemental survey report for review and comment by FAA, U.S. Department of the Navy, CalTrans, San Bernardino County, SANBAG, CHP and Clark County Department of Aviation, and for review and approval by BLM's Authorized Officer and the CPM.

Power Tower Lighting

TRANS-5 The project owner shall ensure that each power tower is marked and lighted according to the recommendations included in the FAA aeronautical study performed for each tower. Additionally, the project owner shall submit FAA Form 7460-2 Part II, Notice of Actual Construction or Alteration, to the FAA within 5 days of completion of construction of the tower to its greatest height.

The project owner shall provide evidence of compliance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting by submitting a copy of Form 7460-2 to BLM's Authorized Officer and the CPM for review and approval upon completion of construction or each power tower.

Verification: Within 5 days of completion of construction of each of the seven power towers, the project owner shall submit the above referenced evidence to BLM's Authorized Officer and the CPM for review and approval.

FAA Notification

TRANS-6 Prior to start-up and testing activities of the plant and all related facilities, the project owner shall coordinate with the FAA to notify all pilots using the airspace in the vicinity of the ISEGS of potential air hazards from turbulence.

Verification: At least 60 days prior to start of project operation, the project owner shall submit to BLM's Authorized Officer and the CPM for review a letter from the FAA showing compliance with these measures. These notification activities would include, but not be limited to: 1) issuing a notice to airmen of the identified air hazard, 2) updating all applicable FAA-approved airspace charts to indicate that plume hazards could exist up to an altitude of 1,350 feet above the ground surface, and 3) requesting FAA to require pilots to avoid direct overflight of the ISEGS site at or below this altitude during daylight hours.

4.11.5 Summary

The proposed project's potential construction and operational impacts related to the regional and local traffic and transportation system are summarized as follows:

1. During construction, project-related construction traffic would not result in an unacceptable level of service along study area roadway segments or intersections, and therefore no adverse impacts would be created by workforce traffic and truck traffic. The project would exacerbate existing congestion on I-15 on Friday afternoons in the area of Yates Well Road, resulting in an adverse impact at that time. To reduce the proposed project's construction- and operation-related contribution to congestion on northbound I-15 on Friday afternoons, mitigation measure **TRANS-1** would require a Traffic Control Plan.
2. During construction, the project would substantially increase the volume of traffic on roadways and intersections in the vicinity of recreation resources. Therefore, mitigation measure **TRANS-1** requires adequate signage along local roads and intersections to alert travelers to the presence of construction vehicles.
3. Because proposed project construction traffic has the potential to result in unexpected damage to Yates Well Road and I-15 freeway ramps, mitigation measure **TRANS-2** is required to ensure that any damage to local roadways would be repaired to pre-project levels to not present a safety hazard to motorists.
4. Saturday through Thursday during operation, workforce and truck traffic to and from the facility would not result in a substantial increase in congestion, deterioration of the existing level of service, or creation of a traffic hazard during any time in the daily traffic cycle and would therefore not have a direct, adverse impact on routes or roadway intersections that would be used to access the ISEGS site.
5. Solar radiation and light reflected from proposed project heliostats could cause a human health and safety hazard to observers in vehicles on adjacent roadways or air traffic flying above the site, and could cause a distraction of drivers on I-15 that would lead to road hazards and to pilots of aircraft flying over the site.

Mitigation measure **TRANS-3** would ensure that solar radiation and light from the heliostats does not impair the vision of motorists or pilots traveling near the site and that the potential for exposure of observers does not cause a human health and safety hazard.

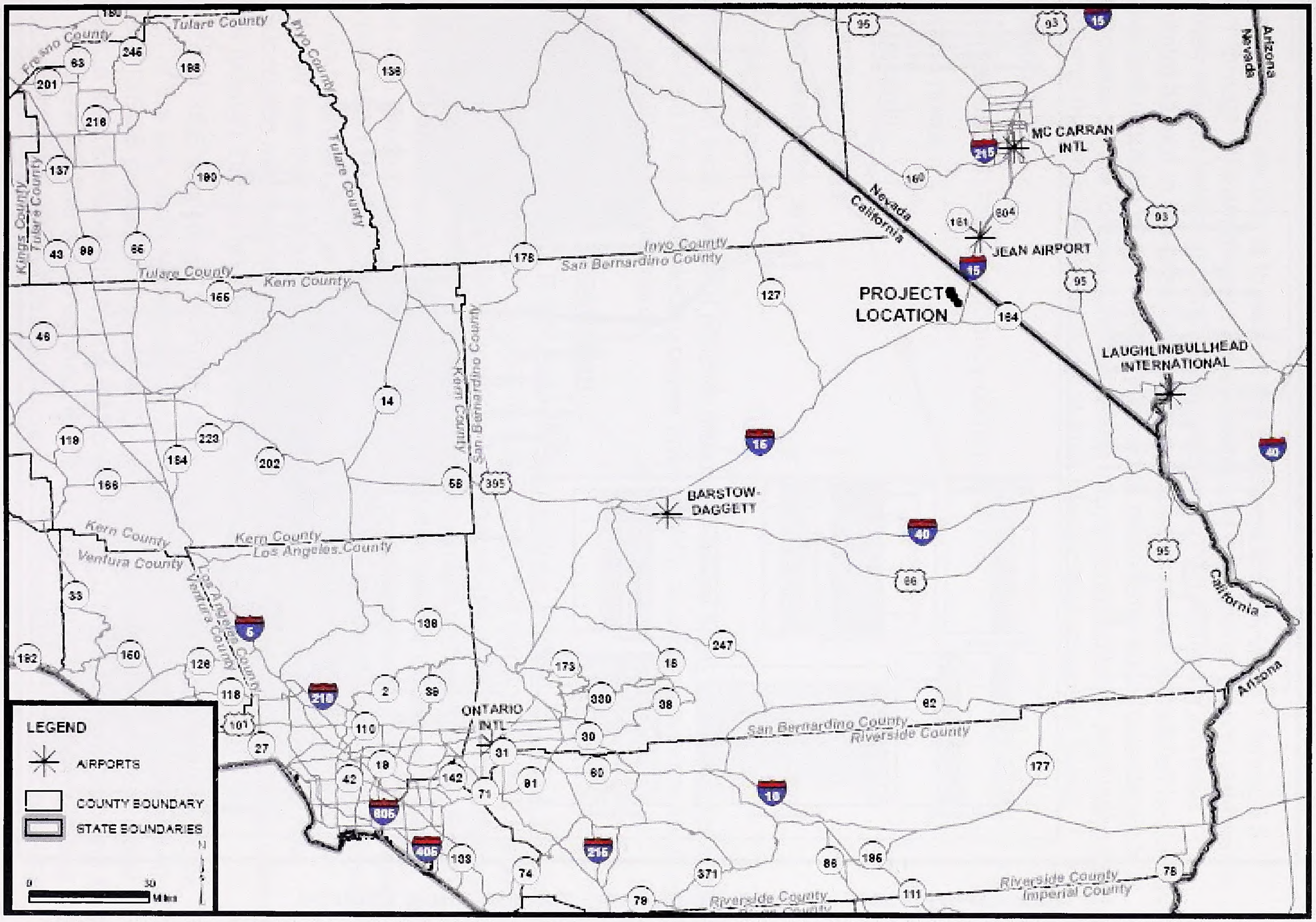
6. Solar radiation and light reflected from proposed project power tower receivers is not expected to pose a human health and safety hazard to navigation of vehicles on adjacent roadways or air traffic flying above the site, but could potentially cause a distraction of drivers on I-15 that would lead to road hazards. Mitigation measure **TRANS-4** would ensure that glare from power tower receivers does not impair the view of motorists or pilots traveling near the site and that the potential for exposure of observers to light reflected from heliostats is minimized to the extent possible.
7. Because the proposed project would result in construction of structures greater than 200 feet tall in the vicinity of a proposed airport and existing military training flight route, mitigation measure **TRANS-5** is required to ensure that onsite power towers are lighted in accordance with FAA recommendations. The project would not adversely affect aircraft operations associated with any aircraft flight traffic.
8. The construction and operation of the ISEGS as proposed, with the effective implementation of mitigation measures, would ensure that the project's direct adverse traffic and transportation impacts would be avoided or reduced in magnitude.
9. Vehicle trips generated by construction and operation of the ISEGS would combine with vehicle trips generated by past, present and reasonably foreseeable projects to contribute to the existing adverse, cumulative impact of congestion on northbound I-15 on Friday afternoons.
10. With the implementation of the traffic control plan required by mitigation measure **TRANS-1**, construction and operation of the ISEGS would not cause a direct adverse impact on northbound I-15 on Friday afternoons, but would contribute to an existing cumulative adverse impact on northbound I-15 on Friday afternoons.
11. During project operation, heat exhaust from the Ivanpah 3 air cooled condenser would result in thermal plumes that would result in the potential for aircraft to experience turbulence at an altitude of 1,350 feet or less. Therefore, mitigation measure **TRANS-6** is required to ensure that thermal plumes associated with ISEGS operation do not impact aviation activities within the navigable airspace above the site.

Because the employment levels, and therefore commuting trips by workers, would be the same for the proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative, the direct adverse impact, and contribution to cumulative adverse impacts, on Interstate 15 on Friday afternoons would be the same for each alternative. The primary difference in traffic impacts would be that the impacts associated with construction and decommissioning of the Mitigated Ivanpah 3 and Modified I-15 Alternatives would occur for a shorter duration than for the proposed project.

Table 4.11-12
Comparison of Traffic and Transportation Impacts

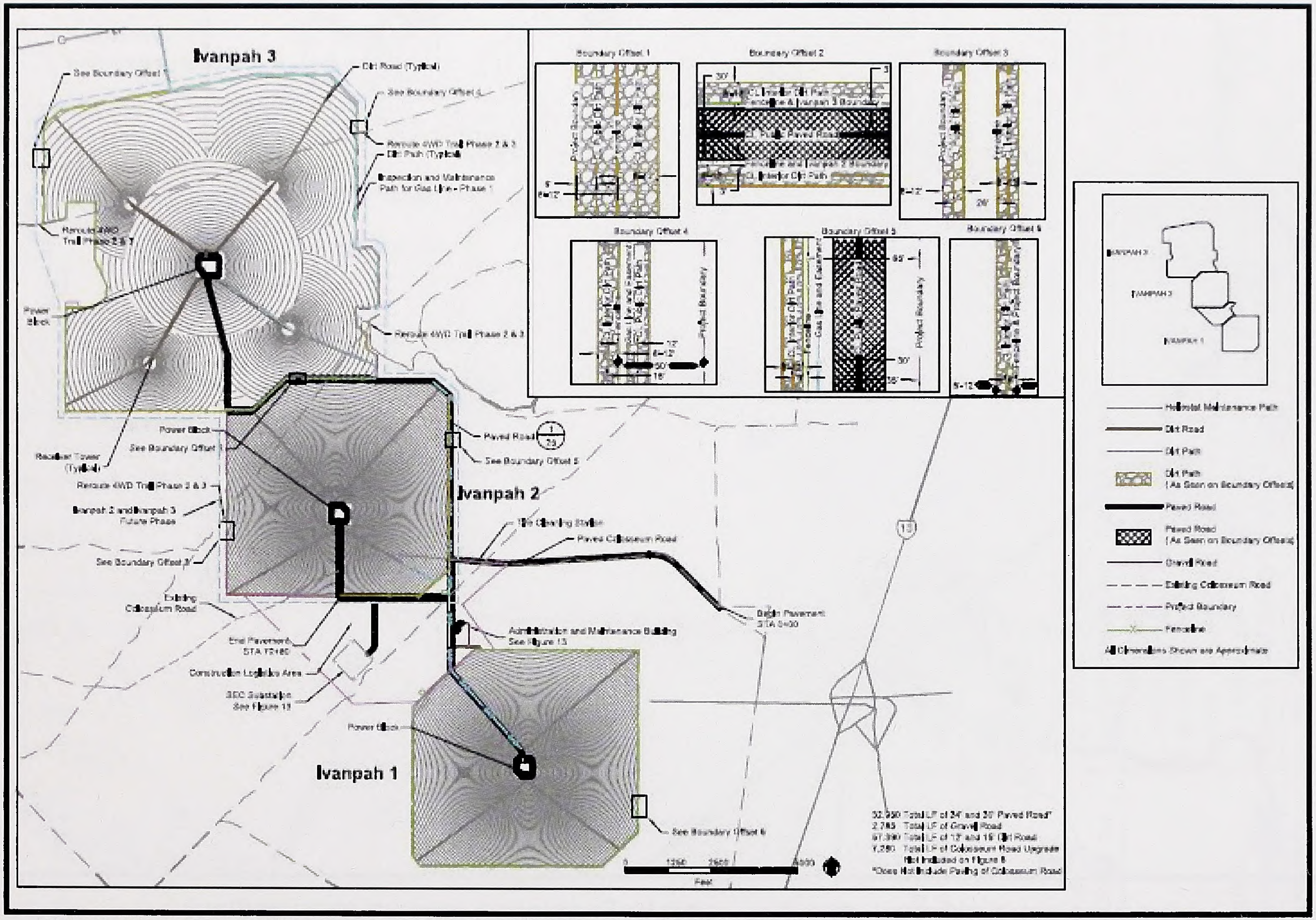
Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Direct impact to LOS on Interstate 15	Direct and adverse on Friday afternoons, would be mitigated by Traffic Control Plan	Direct and adverse on Friday afternoons, would be mitigated by Traffic Control Plan	Direct and adverse on Friday afternoons, would be mitigated by Traffic Control Plan	No potential impact
Contribution to cumulative impact to LOS on Interstate 15	Direct and adverse on Friday afternoons, would be mitigated by Traffic Control Plan	Direct and adverse on Friday afternoons, would be mitigated by Traffic Control Plan	Direct and adverse on Friday afternoons, would be mitigated by Traffic Control Plan	No potential impact
Glare impacts	Difficult to predict. To be evaluated by monitoring.	Difficult to predict, but anticipated to be lower than proposed project. To be evaluated by monitoring.	Difficult to predict, but could be higher than proposed project. To be evaluated by monitoring.	No potential impact

Figure 4.11-1
Ivanpah Solar Electric Generating System - Regional Transportation Network


Arizona
Nevada
MC CARRAN INTL
JEAN AIRPORT
LAUGHLIN/BULLHEAD INTERNATIONAL
PROJECT LOCATION
Nevada
California
BARSTOW-DAGGETT
ONTARIO INTL
California
Arizona
Inyo County
San Bernardino County
Tulare County
Kern County
Fresno County
Kings County
Kern County
San Bernardino County
Kern County
Los Angeles County
Kern County
Ventura County
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Riverside County
Imperial County
LEGEND
AIRPORTS
COUNTY BOUNDARY
STATE BOUNDARIES
0
30
Miles
N

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: AFC Fig. 5.12-1

Figure 4.11-2
Ivanpah Solar Electric Generating System - Local Roadways


Ivanpah 3
Ivanpah 2
Ivanpah 1
See Boundary Offset 1
Dirt Road (Typical)
See Boundary Offset 4
Reroute 4WD Trail Phase 2 & 3
Dirt Path (Typical)
Inspection and Maintenance Path for Gas Line - Phase 1
Reroute 4WD Trail Phase 2 & 3
Power Block
Receiver Tower (Typical)
Power Block
See Boundary Offset 1
Reroute 4WD Trail Phase 2 & 3
Ivanpah 2 and Ivanpah 3 Future Phase
See Boundary Offset 3
Existing Colosseum Road
End Pavement STA 75+80
Construction Logistics Area
SCE Substation See Figure 13
Power Block
Paved Road
See Boundary Offset 5
Tie Clearing Station
Paved Colosseum Road
Administration and Maintenance Building See Figure 13
Begin Pavement STA 0+00
See Boundary Offset 6
15
Boundary Offset 1
Boundary Offset 2
Boundary Offset 3
Boundary Offset 4
Boundary Offset 5
Boundary Offset 6
Project Boundary
Heliostat Maintenance Path
Dirt Road
Dirt Path
Dirt Path (As Seen on Boundary Offsets)
Paved Road
Paved Road (As Seen on Boundary Offsets)
Gravel Road
Existing Colosseum Road
Project Boundary
Fenceline
All Dimensions Shown are Approximate
0
1250
2500
5000
Feet
32,950 Total LF of 24' and 30' Paved Road*
2,785 Total LF of Gravel Road
67,390 Total LF of 12' and 18' Dirt Road
7,290 Total LF of Colosseum Road Upgrade
Not Included on Figure 8
*Does Not Include Paving of Colosseum Road

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Attachment DR130-2B Figure 15

4.12 Transmission Line Safety and Nuisance

Introduction

The purpose of this section is to assess the proposed ISEGS Units 1 through 3 (Ivanpah 1 through 3) transmission lines' design and operational plan to determine whether their related field and non-field impacts would constitute an adverse environmental hazard in the areas around the proposed routes. All related health and safety laws and regulations are currently aimed at minimizing such hazards. BLM's analysis focuses on the following issues taking into account both the physical presence of the lines and the physical interactions of their electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- EMF exposure.

Federal, state, and local laws and policies discussed below apply to the control of the field and non-field impacts of electric power lines. BLM's analysis examines the project's compliance with these requirements.

Resource-Specific Project Description

As discussed by the applicant, Bright Source Energy/Solar Partners I, LLC/J. Woolard, (CH2M Hill 2007 pp. 3-1 through 3-5, 5.6-1, 5.6-2, and 5.6-7 through 5.6-12), the total area required for the three facilities (Ivanpah 1–3) that would constitute the proposed ISEGS would be 4,073 acres of federal land currently managed by the BLM. Each of these facilities would consist of a solar field and related electric power generating equipment from which the generated power would be interconnected to SCE's power grid via a new 220/115-kV SCE substation (Ivanpah Substation) to be located between Ivanpah 1 and Ivanpah 2. The connection to the SCE grid would be through SCE's existing 115-kV line that will be upgraded to 220 kV for 36 miles between the new Ivanpah Substation and the existing Eldorado Substation in Nevada. This transmission line passes through the site on a northeast-southwest right-of-way.

The upgrade of SCE's existing 115-kV line is known as the EITP, and would involve modification of the line on BLM-managed public lands. This project is independent of the proposed ISEGS project, and is currently undergoing a separate environmental review under a joint EIR and EIS by the California Public Utilities Commission and BLM. However, because the line would connect to ISEGS, detailed information regarding the EITP project is provided within this section, and also presented in the other resource sections as applicable.

The EITP would involve several types of transmission upgrades to connect renewable energy generated in the Ivanpah Valley area to the transmission grid controlled by the CAISO. A new 230/115-kV Ivanpah Substation, a double-circuit 230-kV transmission line between the existing Eldorado Substation and the Ivanpah Dry Lake area to replace the existing 115-kV line, and a telecommunication system would be constructed. The reliability of the existing 115-kV transmission line would also be improved in compliance with the NERC and WECC planning criteria, the NERC reliability standards, and the applicant's standards.

The core project would include the transmission upgrades and associated transmission infrastructure and the alternatives included in the application submitted by SCE to the CPUC and the BLM. SCE proposes to construct, operate, and maintain new and upgraded transmission facilities to deliver electricity from several solar energy facilities proposed to be built in the Ivanpah Valley area. The upgraded transmission lines would extend approximately 35 miles from southern Clark County, Nevada, to northeastern San Bernardino County, California. Approximately 28 miles of the project are in Nevada and 7 are in California. The proposed EITP project would include the following components:

- Powerlines
  - Eldorado–Ivanpah Transmission Line – A new double-circuit 230-kV transmission line, approximately 35 miles long, would be constructed between the existing Eldorado Substation in Nevada and the proposed Ivanpah Substation in California. It would replace a portion of the existing 115-kV transmission line that runs from Eldorado through Baker, Cool Water, and Dunn Siding to Mountain Pass. The existing 115-kV transmission line that runs west of the proposed Ivanpah Substation to Mountain Pass Substation would remain unchanged.
  - Subtransmission Line – A proposed 600- to 800-foot-long addition to an existing 115-kV subtransmission line from a connection point on the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV line would connect the proposed Ivanpah Substation to the existing 115-kV subtransmission system.
  - Distribution Lines – A 1-mile extension of the existing Nipton 33-kV distribution line would be constructed with underground circuitry to provide light and auxiliary power to the proposed Ivanpah Substation. In addition, a new 4,300-foot segment from the existing Nipton 12-kV distribution line would be built to provide power to a proposed microwave telecommunications site.
- Substations
  - Ivanpah Substation – The proposed substation would be located in California near Primm, Nevada, and would serve as a connector hub for solar energy generated in the Ivanpah Valley area. The substation would include a mechanical and electrical equipment room and a microwave tower.
  - Eldorado Substation – Changes inside the existing Eldorado Substation would be made to accommodate the new Eldorado–Ivanpah 230-kV transmission line.

- Telecommunication System
  - Existing overhead ground wire would be replaced with optical ground wire on an approximately 25-mile section of the existing Eldorado–Lugo 500-kV transmission line.
  - A 4.8-mile-long underground duct from the Eldorado–Lugo 500-kV transmission line to a proposed communication site in Nipton, California, would be installed.
  - A microwave path (approximately 12 miles) between Nipton and the proposed Ivanpah Substation would be installed that would consist of two 180-foot-tall communication towers.
  - A communications room would be installed in the mechanical and electrical equipment room at the new Ivanpah Substation to house communication equipment.
  - Telecommunication equipment would be installed at the Eldorado Substation.

Construction of the EITP components would also involve the temporary use of areas and facilities on public and private lands for equipment and material storage, structure assembly and erection, conductor pulling and tensioning, helicopter landing, and other uses.

Applicable Laws, Regulations, and Supplemental Authorities

Table 4.12-1
Applicable Laws, Regulations and Supplemental Authorities

Laws, Regulations, and Standards	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations,"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a FAA "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.

Laws, Regulations, and Standards	Description
Audible Noise	
Local	
San Bernardino County General Plan, Noise Element	References the county's Ordinance Code for noise limits.
San Bernardino County Development Code	Establishes performance standards for planned residential or other noise-sensitive land uses.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of Regulations section 2700 et seq. "High Voltage Safety Orders"	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC "Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California"	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
ANSI/IEEE 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

4.12.1 Affected Environment

The proposed project generator tie-in line system would consist of the following individual segments:

- one new, single-circuit 115-kV overhead transmission line extending 5,800 feet from the Ivanpah 1 switchyard to the Ivanpah Substation;

- two new single-circuit 115-kV overhead transmission lines extending from the Ivanpah 2 and Ivanpah 3 switchyards and merging into a double-circuit overhead transmission line at a point 1,400 feet from the Ivanpah Substation before entering it;
- each generating unit's own 115-kV on-site switchyard through which its line would extend towards the Ivanpah Substation;
- project-related reliability upgrades of the area's SCE 115-kV line system; and
- SCE's new 220/115-kV Ivanpah Substation.

The generator tie-in line for Ivanpah 3 would be 14,000 feet long while the one for Ivanpah 2 would be 3,900 feet. All three lines and related facilities would be designed, operated, and maintained in keeping with SCE guidelines that ensure line safety and efficiency together with reliability and maintainability. The applicant provided the details of the proposed support structures as related to line safety, maintainability, and field reduction efficiency (CH2M Hill 2007, Figures 3.2-1 and 3.2-30) (CH2M Hill 2008d).

4.12.2 Environmental Consequences

Methodology

The potential magnitude of the line impacts of concern in this analysis depends on compliance with the listed design-related laws, regulations and industry practices. These laws, regulations, and practices have been established to eliminate and/or mitigate the potential for adverse impacts. Thus, if the project complies with applicable laws, regulations, and standards, the project would not have any adverse transmission line-related safety and nuisance impacts. The nature of these individual impacts is discussed below, together with the potential for compliance with the laws and regulations that apply.

4.12.2.1 Proposed Project

Construction Impacts

The proposed project lines would be built and maintained in keeping with standard SCE practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and not for 115-kV lines such as the proposed lines. The lines' proposed low-corona designs are used for all SCE lines of similar voltage rating to reduce surface-field strengths and the related potential for corona effects. Since the proposed lines would traverse an uninhabited open space, BLM does not expect any corona-related radio-frequency interference or related complaints, and has not identified any related mitigation measures.

Operations Impacts

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements listed in **Table 4.12.1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. As noted by the applicant (CH2M Hill 2007, pp. 3-13 and 3-14), these regulations require FAA notification in cases of structures over 200 feet from the ground. Notification is also required if the structure is to be below 200 feet in height but would be located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet from the runway. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area that extends 5,000 feet.

One existing public airport, Jean Airport, is located approximately 14 miles northeast of the project site and one mile south of Jean Nevada. In addition, one additional airport is proposed for the same area, the Southern Nevada Supplemental Airport. Jean Airport has two paved runways that serve less than 50 aircraft, most of which are single engine airplanes and gliders (AirNav.com 2008).

The FAA and BLM are currently preparing an Environmental Impact Statement for the proposed Southern Nevada Supplemental Airport to be constructed on approximately 6,000 acres of land just south of Jean, Nevada (VHB 2008). As currently planned, the proposed Southern Nevada Supplemental Airport would provide sufficient airport capacity to accommodate future aircraft operations and aviation passenger demand in the Las Vegas Metropolitan Area (VHB 2008). The proposed ISEGS would be located approximately 40,000 feet (7.6 miles) southwest of the nearest runway at the proposed Southern Nevada Supplemental Airport.

The maximum height of 85 feet for the proposed transmission line support structures (CH2M Hill 2007 Figure 3.2-2) would be much less than the 200 feet that triggers the concern over aviation hazard according to FAA requirements. As noted in Section 4.11 of this document, the FAA has determined that even the tallest structures of the proposed ISEGS, the 459-foot high solar power towers, would not pose a hazard to aviation.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts is therefore minimized by reducing the line electric fields and locating the line away from inhabited areas.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without substantial impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. It is, therefore, not generally expected at substantial levels from lines of less than 345 kV as proposed for ISEGS. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the low-corona designs are also aimed at minimizing field strengths, BLM does not expect the proposed line operation to add substantially to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to Section 4.7.

Fire Hazards

The fire hazards addressed through the related laws and regulations in **Table 4.12-1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

Standard fire prevention and suppression measures for similar SCE lines would be implemented for the proposed project lines (CH2M Hill 2007, p. 3-14). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Mitigation measure **TLSN-3** would ensure compliance with important aspects of the fire prevention measures.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines. No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public. The applicant's stated intention to implement the GO-95-related measures against direct contact with the energized line (CH2M Hill 2007, p. 3-14) would serve to minimize the risk of hazardous shocks. Mitigation measure **TLSN-1** would be adequate to ensure implementation of the necessary standards to avoid hazardous shocks.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing substantial physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields. There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the ANSI and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way. The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (CH2M Hill 2007, p.3-13). Mitigation measure **TLSN-4** would ensure such grounding for ISEGS.

Electric and Magnetic Field (EMF) Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure.* The available evidence as evaluated by the CPUC and other regulatory agencies has not established that such fields pose a health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines.

While such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. In light of present uncertainty, the proposed project should accomplish feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.
- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State Requirements

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

In keeping with this CPUC policy, each proposed overhead line would need to be designed according to the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new lines in California be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings did not point to a need for substantial changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project line, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

Industry's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, it is important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the DOE, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term, while the exposures from power lines are lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Such exposure differences are only discussed to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed line upgrade to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures to be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;
2. reducing the spacing between the conductors to an optimal level;
3. minimizing the current in the line; and
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Since the routes of the proposed project lines would have no nearby residences, the residential field exposures at the root of the health concern of recent years would not be a consideration. The strengths of the lines' fields along the routes would depend on the effectiveness of the applied field-reducing measures. The applicant (CH2M Hill 2007, pp. 3-9 through 3-12 and Figures 3-31 through 3-39) calculated the maximum electric and magnetic field intensities expected along all the proposed routes. The maximum electric field strength was calculated as 1.04 kV/m, which is similar to those of SCE lines of the same voltage rating. The maximum magnetic field intensity of 117.14 mG is similar to that of similar SCE lines (as required under current CPUC regulations) but is much less than the 200 mG currently specified by the few states with regulatory limits. The requirements in mitigation measure **TLSN-2** for field strength measurements are intended to validate the applicant's assumed reduction efficiency.

Closure/Decommissioning Impacts

If the proposed ISEGS were to be closed, decommissioned and all related structures are removed as described in Section 3, the minimal aviation risk and electric shocks and fire hazards from the physical presence of the tie-in lines would be eliminated. Decommissioning and removal would also eliminate the lines' field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure. Since the lines would be designed and operated according existing SCE guidelines, these impacts would be as expected for SCE lines of the same voltage and current-carrying capacity.

Beneficial Impacts

Since the proposed ISEGS tie-in lines would pose specific, although insignificant risks of the field and non-field effects of concern in this analysis, their building and operation would not yield any public benefits regarding the effort to minimize any human risks from these impacts.

4.12.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

The transmission lines would not operate during the construction period. Therefore, the potential for transmission line safety and nuisance impacts would not exist for either the proposed project or the Mitigated Ivanpah 3 Alternative.

Operations Impacts

The construction, location, and operation of the transmission lines would be the same for the proposed project and the Mitigated Ivanpah 3 Alternative. Because no potential impacts were identified for the proposed project, there would be no potential impacts associated with operation of the Mitigated Ivanpah 3 Alternative.

Closure/Decommissioning Impacts

The transmission lines would not operate during the closure and decommissioning. Therefore, the potential for transmission line safety and nuisance impacts would not exist for either the proposed project or the Mitigated Ivanpah 3 Alternative.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with transmission line safety and nuisance.

4.12.2.3 Modified I-15 Alternative

Construction Impacts

The transmission lines would not operate during the construction period. Therefore, the potential for transmission line safety and nuisance impacts would not exist for either the proposed project or the Modified I-15 Alternative.

Operations Impacts

The construction, location, and operation of the transmission lines would be the same for the proposed project and the Modified I-15 Alternative. Because no potential impacts were identified for the proposed project, there would be no potential impacts associated with operation of the Modified I-15 Alternative.

Closure/Decommissioning Impacts

The transmission lines would not operate during the closure and decommissioning. Therefore, the potential for transmission line safety and nuisance impacts would not exist for either the proposed project or the Modified I-15 Alternative.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with transmission line safety and nuisance.

4.12.2.4 No Action

Failure to build ISEGS and its related tie-in transmission lines would eliminate the potential field and non-field impacts of specific concern in this analysis. Since the lines would be designed and operated according to existing SCE guidelines, these avoided impacts would be as expected for similar area SCE lines.

4.12.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in this case is SCE. Since the proposed project lines and related switchyards would be designed according to the respective requirements of the laws and regulations listed in **Table 4.12-1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, the proposed design and operational plan would be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in mitigation measure **TLSN-2**.

4.12.4 Mitigation Measures

TLSN-1 The project owner shall construct the proposed generation tie lines to the first point of interconnection according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2. High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's EMF reduction guidelines.

Verification: At least 30 days before starting the generation tie lines or related structures and facilities, the project owner shall submit to BLM's Authorized Officer and the CPM a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the line at the points of maximum intensity along the route for which the applicant provided specific estimates. The measurements shall be made before and after energization according to the ANSI/IEEE standard procedures. These measurements shall be completed no later than 6 months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with BLM's Authorized Officer and the CPM within 60 days after completion of the measurements.

TLSN-3 The project owner shall ensure that the rights-of-way of the proposed generation tie lines are kept free of combustible material, as required under the provisions of section 4292 of the Public Resources Code and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report to be provided to BLM's Authorized Officer and the CPM.

TLSN-4 The project owner shall ensure that all permanent metallic objects within the right-of-way of the project-related generation tie lines are grounded according to industry standards regardless of ownership.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to BLM's Authorized Officer and the CPM a letter confirming compliance with this measure.

4.12.5 Summary

The proposed transmission lines are not expected to pose an aviation hazard according to current FAA criteria, and therefore it is not necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed ISEGS and similar transmission lines, the public health impacts of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would not be an issue for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a substantial human health hazard.

Since the proposed project line would be operated to minimize the health, safety, and nuisance impacts of concern, and would remain in its present route without nearby residences, the proposed design, maintenance, and construction plan would comply with the applicable laws. With implementation of the mitigation measures proposed above, direct or indirect adverse impacts would not occur.

Because the transmission lines would be the same under the proposed project, the Mitigated Ivanpah 3 Alternative, and the Modified I-15 Alternative, the potential impacts would be the same for all three alternatives. However, in each case, the potential for adverse impacts would be minimized by compliance with regulations and industry standards for operation of transmission lines.

Table 4.12-2
Comparison of Transmission Line Safety and Nuisance Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Aviation safety	No potential impact	No potential impact	No potential impact	No potential impact
Audible noise	No potential impact	No potential impact	No potential impact	No potential impact
Fire hazards	Minimized by compliance with regulations and industry standards	Minimized by compliance with regulations and industry standards	Minimized by compliance with regulations and industry standards	No potential impact
Hazard shocks	Minimized by compliance with regulations and industry standards	Minimized by compliance with regulations and industry standards	Minimized by compliance with regulations and industry standards	No potential impact
Nuisance shocks	Minimized by compliance with regulations and industry standards	Minimized by compliance with regulations and industry standards	Minimized by compliance with regulations and industry standards	No potential impact
EMF exposure	Minimized by compliance with regulations and industry standards	Minimized by compliance with regulations and industry standards	Minimized by compliance with regulations and industry standards	No potential impact

4.13 Visual Resources

Introduction

The following analysis evaluates potential visual impacts of the ISEGS and its consistency with applicable laws and regulations. Adopted expressions of local public policy pertaining to visual resources are also given great weight in determining levels of viewer concern. Mitigation measures are required, as needed, to reduce adverse impacts, and to conform with laws and regulations.

Resource-Specific Project Description

Power Plant

Figure 4.13-1 depicts the layout of the three proposed units. **Figure 4.13-2** depicts architectural elevations of the Ivanpah 3 power block, based upon the original AFC plan. Components of the other two units would be essentially similar in appearance and heights. **Figure 4.13-3** depicts elevations of the proposed mirror units.

Solar Power Towers, Receivers, and Mirror Arrays (Heliostats)

The overall area of the three proposed project phases would be approximately 6.4 square miles or 4,073 acres, most of which would be occupied by mirror fields. Under the modified project plan, there would be one power tower each at Ivanpah 1 and 2, and five towers at Ivanpah 3. All proposed towers would have an overall height of approximately 459 feet (140 meters), with an additional 5 to 10 feet of FAA-required lighting. Mirror array units would be approximately 12 feet (4 meters) tall (Data Response Set 1D, #4, CH2M Hill 2008d). Power towers would require day and night FAA strobe lighting.

Other visually prominent structures would include steam turbine generators, air-cooled condensers, water storage tanks, a 16-acre substation, administrative and maintenance facilities, and new transmission lines and towers (described below). Of these the most prominent would be the Ivanpah 1 air-cooled condenser (approximately 92 feet in height) (AFC Figure 2.2-1c); and new transmission towers (CH2M Hill 2007).

Site Grading

Site grading would potentially represent a significant visual component of the proposed project during construction. Surface disturbance of the proposed site, as in most desert landscapes of the region, can result in high contrast between the disturbed area and surroundings, due to high contrast between the disturbed soil color and albedo, and the color and albedo of the existing undisturbed, vegetated surface (Data Response Set 2, # 150, CH2M Hill 2008e). Alterations in landform from construction of berms, ponds, and channels could also be visually prominent features of the project.

Plant Night Lighting

Lighting to support plant operation would be required but is not described in detail in the AFC. FAA strobe and other aircraft warning lighting is assumed to be required atop the tall solar receiver towers due to proximity to existing and possible future flight paths.

Transmission Lines

Approximately 22,400 feet of new 115-kV generation tie lines and single-pole towers would be introduced within the project boundaries (please refer to Section 3). In addition, approximately 36 miles of existing transmission line within California and Nevada would be upgraded from 115 kV to 220 kV lines to accommodate the additional load of ISEGS and other foreseeable energy projects.

Water Lines

Water would be provided from two wells located adjacent to the northwest corner of Ivanpah 1. Each of the three power blocks would be connected to the groundwater wells by underground water pipelines. (Data Response Set 1D, #4, CH2M Hill 2008d). Potential visual effects would result primarily from color contrast of soil disturbance and vegetation removal for pipeline construction.

Gas Lines

Natural gas would be supplied to the site through a new, proposed six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. The ROW area required for this section of the pipeline would be 75 feet wide and 0.5 miles long. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line will extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. (Data Response Set 1D, #4, CH2M Hill 2008d). Typical visual effects of new pipeline consist primarily of color contrast between adjoining undisturbed land and pipeline right-of-way due to soil disturbance and vegetation removal, an effect that usually persists for the long term in arid environments

Construction Staging Area

Construction parking and laydown would occur within the units under construction. A 377.5-acre construction logistics area would be located between Ivanpah 1 and 2. After Ivanpah 3 construction is complete, associated fabrication buildings would be removed and the area restored. Upon completion of construction, a 16.1-acre site would be utilized by the new Ivanpah substation and a 8.9 acres for the administration buildings, warehouse and parking facilities (DR Set 1D, # 4, CH2M Hill 2008d).

Applicable Laws, Regulations, and Supplemental Authorities

Table 4.13-1
Applicable Laws, Regulations and Supplemental Authorities

Applicable Laws or Regulations	Description
Federal	
National Environmental Policy Act	Under the NEPA, it is the responsibility of the federal government to "use all practicable means to ensure all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings (42 USC 4331(b)2)."
Federal Land Policy and Management Act of 1976	FLPMA is the enabling legislation establishing the Bureau of Land Management's responsibilities for lands under its jurisdiction. Section 102 (a) of the FLPMA states that "…the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values …." Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) …." Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will... minimize damage to the scenic and esthetic (sic) values…."
California Desert Conservation Area Plan	The ISEGS project is located within the California Desert Conservation Area Plan, which is the BLM Resource Management Plan applicable to the project site (DOI, 1980, as amended). The CDCA Plan did not include Visual Resource Management (VRM) inventory or management classes. However, BLM developed updated Visual Resource Inventory (VRI) mapping in 2008 (DOI, 2008). The ISEGS site is classified in the CDCA Plan as Multiple-Use Class (MUC) L (Limited Use). Multiple-Use Class L, the most restrictive under the plan, "protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished." The CDCA Plan includes a table (Table 1) which illustrates the types of allowable land uses by MUC Class. The table specifically includes Electrical Power Generation Facilities including Wind/Solar facilities. Guidance provided under this section allows for the authorization of such facilities within MUC Class L lands in compliance with NEPA requirements.

Applicable Laws or Regulations	Description
Northern and Eastern Mojave CDCA Plan Amendments, 2002	The NEMO plan amendments to the CDCA Plan did not directly affect visual resource management. Among the elements of the NEMO plan amendments was designation of approved motorized vehicle trails, including several such trails within the ISEGS site. According to the NEMO Routes Designation EA, "the off-road vehicle experience of traveling historic routes provides an educational and scenic experience of the natural wonders of a harsh desert region and the elements that the pioneers and founders of the historical route had to endure." (DOI, 2004). The East Mojave Heritage Trail, a 650-mile trail identified in the NEMO Proposed Route Designation Plan Amendment as a major historical trail of scenic, historic, and Native American values, is one such designated trail within the Ivanpah Valley. However, it does not cross the ISEGS site and would not be affected by the project (Murray, Tel. Con. 9/23/08).
National Historic Preservation Act	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's "…setting… (or) feeling…" in a way that affects the property's eligibility for listing, may result in a substantial adverse effect. "Examples of adverse effects…include… Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features…" (36 CFR Part 800.5)
State	
State Scenic Highway Program	The California State Department of Transportation (Caltrans) identifies a state system of eligible and designated scenic highways which, if designated, are subject to various controls intended to preserve their scenic quality (Ca. Streets and Highways Code, Sections 260 through 263). Highway I-15 within the project viewshed is not listed as an eligible State Scenic Highway.
Local	
County of San Bernardino General Plan	Various policies of the Conservation and Open Space Elements of the San Bernardino County General Plan refer to the protection of scenic resources in the project area, as described in detail in Visual Resources Table 3. In particular, Open Space Policies 5.1 through 5.3 provide protection to designated County scenic routes. Highway I-15 in the Ivanpah Valley is a designated County scenic route. The San Bernardino County General Plan is not applicable to projects located on Federal lands.
Night Sky Protection Ordinance Ord. 3900 (San Bernardino County Code 87.0921)	Ordinance intended "to encourage effective, non-detrimental lighting; to maintain night-time safety, utility, security and productivity; and to encourage lighting practices and systems which will minimize light pollution, glare and light trespass, conserve energy and resources and curtail the degradation of the night time visual environment…"

4.13.1 Affected Environment

Regional Landscape Setting

The proposed project landscape is part of the Great Basin section of Fenneman's Basin and Range physiographic province, a vast desert area of the western U.S. extending from eastern Oregon to western Texas, characterized by periodic mountain ranges separated by desert plain (Fenneman 1931). It is also located within the Mojave Desert, and is immediately north and east of the northernmost portions of the Mojave National Preserve. Locally, the site is situated within the Ivanpah Valley, notable for the level playa or dry lakebed of Ivanpah Lake. Steeply rising, barren slopes and ridges of the Clark, Spring, and Ivanpah Mountains to the south, west, and north, and the Lucy Gray, McCullough, and New York Mountains to the east, define the Ivanpah Valley in the project vicinity, creating an enclosed viewshed. While the project portion of the Ivanpah Valley is visually relatively intact, it is located roughly 30 miles south of the City of Las Vegas, within a visual corridor along Highway I-15 that becomes increasingly urbanized and less scenically intact as one progresses northward. Thus, in a regional context, the site is located at the outer edge of urban influence of the City of Las Vegas metropolitan area. I-15 adjacent to the project site is the principal travel route for visitors to Las Vegas from southern California.

Project Site

Figure 4.13-4, Views of the Project Site, depicts views of the Ivanpah Valley from the vicinity of the proposed project site.

The ISEGS site comprises approximately four square miles west of Highway I-15 and the northern half of the Ivanpah Lake dry lakebed. The site occupies a moderately sloping alluvial fan or bajada that descends eastward from the foot of the Clark Mountains and MNP immediately to the west. Visual exposure to viewers on I-15, due both to proximity and slope orientation, is thus high. This portion of the Ivanpah Valley, defined at the north by a pass between the Clark and Lucy Gray Mountains at Primm, Nevada, is scenically relatively intact, as depicted in **Figure 4.13-4**. The Bighorn Electric Generating Station, the town of Primm at the north end of the valley, the Primm Golf Course, existing high-voltage power lines, several unpaved vehicular trails and Highway I-15 intrude on the valley's scenic intactness but overall these features are very subordinate visually, and the landscape appears predominantly undisturbed. The proposed site is located immediately to the west of the Primm Golf Course, a slightly elevated site who's irrigated landscaping and perimeter berm-slopes contrast conspicuously with the surrounding natural landscape for viewers in its vicinity. The project site also surrounds an isolated, 416 -foot tall rock formation that serves as a prominent landmark within a radius of several miles and represents a striking scenic feature of the valley.

Land cover on the site consists primarily of Mojave Creosote Bush Scrub, including areas of small, young Joshua Trees. Surface disturbance is relatively minimal and inconspicuous overall, including unpaved vehicular trails and access roads. The ground surface is largely a medium tan color, further darkened in appearance by the relatively uniform scrub groundcover. With the exception of the vivid rock formation at the center of the site, its bajada/scrub landscape is relatively common throughout the Mojave Desert landscape. The prominent and highly scenic adjacent scenery of slopes, ridges and peak of Clark Mountain, however, lend the project viewshed as a whole a higher degree of scenic interest and value. Similarly, the contrast between perfectly flat dry lakebed and steep, tall, nearby mountain slopes within a narrow enclosed valley lend the landscape a distinctive character with strong visual unity.

Project Area Visual Setting

Project Viewshed

The *viewshed* or area of potential visual effect (the area within which the project could potentially be seen) is indicated by the reddish-colored area in **Figure 4.13-5**. The computer-generated viewshed mapping was projected from the top of the proposed solar collectors. The mapping is accurate within the limits of error of the USGS digital elevation model (DEM) topographic map surveys from which it is created. In this landscape, because of the general absence of tall land-cover that could alter the actual viewshed, the topographically-generated viewshed mapping is considered generally accurate. A feature of this desert landscape is the potential for large projects to be seen over great distances where elevated viewpoints exist, due to the large open areas of level topography and absence of intervening landscape features.

Landscape Units and Key Observation Points

Visual Quality, Viewer Concern, and Viewer Exposure

Figure 4.13-5, Existing Landscape Setting and Key Observation Points (KOPs), subdivides the project viewshed into broad landscape units and their associated overall visual sensitivity levels, and depicts KOPs used as the basis of the impact analysis. (All figures referred to in the text may be found at the end of this section). These units represent contiguous areas with broadly consistent visual character, quality, viewer sensitivity and visibility. Those attributes are reflected in their overall visual sensitivity ratings, which represent a summary of the existing visual quality, viewer concern, and viewer exposure (site visibility) of each unit. These ratings serve as the environmental baseline against which potential project impacts are evaluated. This figure is generally consistent with a Visual Resource Inventory conducted by BLM in 2008 (BLM inventory classifications are provided in parentheses for informational purposes) (DOI, 2008a).

In the discussion below, distance zone terminology is used as follows: 'foreground' is used generically to refer to viewing distances under ½-mile; 'middle-ground' to distances between ½ and 4 miles; 'near middle-ground' refers to that portion of middle-ground under roughly one mile; and 'background' to distances over 4 miles.

The three major landscape units depicted are the Ivanpah Valley floor, including the Ivanpah dry lakebed; and the adjoining mountain ranges that define the valley: the Clark Mountains to the north, west, and south; and the Lucy Gray Mountains to the east. The Clark Mountains are divided into two major categories: portions of the Mojave National Preserve under National Park Service (NPS) jurisdiction; and the Stateline and Mesquite Wilderness Areas (WAs), under BLM jurisdiction.

Figure 4.13-5 also depicts KOPs used as the basis for this analysis. KOPs are used in the Energy Commission visual analysis method to evaluate potential project impacts. These viewpoints represent key sensitive viewer groups and viewing locations likely to be affected by the project. Existing views and simulated views with the proposed project from each KOP may be seen in **Figures 4.13-6** to **4.13-15** at the end of this section. The KOPs below are presented according to landscape unit and key viewer group.

KOPs 1 and 2, representing Primm Golf Course, were presented in the AFC. KOPs 3 and 4, representing worst-case Highway I-15 views, were requested by the Energy Commission. KOPs 5 through 10, representing sensitive outdoor recreation viewer groups, were identified and requested by BLM staff.

Ivanpah Valley Viewpoints (KOPs 1 through 8)

The Ivanpah Valley floor has moderate overall visual sensitivity, with moderate existing visual quality, moderately high viewer concern, and high viewer exposure. (This sensitivity rating was generally consistent with BLM's visual inventory rating).

Primm Valley Golf Course: KOPs 1 – 2

The two KOPs from the AFC are both taken from the Primm Valley Golf Course, located on I-15 south of Ivanpah Lake and east of the proposed project site. Viewing distances are 1.5 miles to Ivanpah 2, and under 1.0 mile to Ivanpah 1, respectively. These KOPs represent a developed, outdoor recreational viewpoint with moderate to high use, at middle-ground distance.

I-15 Motorists: KOPs 3 –5

I-15 views are all within the valley and thus considered to have moderate overall sensitivity. Viewer numbers on this segment of highway are extremely high, particularly on Friday evenings and other peak periods, although the recreational destination for the majority of such motorists is Las Vegas rather than the Mojave Desert and the level of concern with scenic quality thus likely to be moderate or low. Viewing distance ranges from background (over four miles) to near- middle-ground (approximately one mile).

KOP 3: I-15 near Yates Well Road. KOP 3 depicts views of the Ivanpah 2 and 3 portions of the project site from I-15 at middle-ground distance (roughly 2 miles).

KOP 4: I-15 near Yates Well Road. KOP 4 depicts views of the Ivanpah 1 portion of the project site from I-15 at middle-ground distance (roughly 1 mile).

KOPs 3 and 4 correspond to two segments of the overall panorama seen from viewpoints in the portion of I-15 nearest to the project. The project, which occupies too wide an angle of view to be captured in a single photograph at this distance, is depicted in these two views to represent the entire angle of view encompassed by Ivanpah 2 and 3 (KOP 3, to the right), and Ivanpah 1 (KOP 4, to the left). These KOPs are approximately one mile from the proposed project at its nearest point (Ivanpah 1).

KOP 5: I-15 at Nipton Road. KOP 5 depicts views of I-15 motorists as they enter the Ivanpah Valley from the south at background distance (roughly 4 miles). This viewpoint demonstrates the high level of visual exposure toward I-15 created by the site's eastward sloping bajada topography, and represents I-15 views at their farthest point from the project site.

Ivanpah Lake: KOPs 6 –7

KOP 6 is taken from the most heavily used access point for wind sailors, on the eastern side of the dry lakebed. KOP 7 is taken from a second, also heavily used wind sailing access point on the west side of the lakebed, west of I-15.

These KOPs represent a natural, outdoor recreational viewpoint with very high use at far middle-ground/background distances of 4 and 3 miles respectively.

Primm: KOP 8

View from parking lot at southern boundary of Primm (roughly 4 miles). Primm is a high-volume visitor destination within middle-ground distance of the project. Although it is included within the larger landscape unit of the valley, viewer exposure and sensitivity from this indoor activity-oriented KOP is considered relatively low, and existing visual quality, dominated by large parking areas and commercial development, is also relatively low. Nevertheless, open and scenic views toward the project site exist from various locations in the southern area of Primm.

Clark Mountains Viewpoints: (KOPs 9 – 10)

Portions of the project viewshed in the Clark Mountain Range, which encloses the valley to the north, west, and south are comprised almost entirely of either the Mojave National Preserve or Stateline and Mesquite BLM Wilderness Areas, as indicated in **Figure 4.13-5**. The fact that these areas were designated for special status under the Desert Protection Act (DPA) reflects their unusually high scenic and recreational value.

Both the MNP and BLM WAs are regarded as high viewer concern locations due to their special designated status. This fact is amplified by the high visitor numbers reported by the National Park Service in surveys of visitors to the Clark Mountains cited below. This, in combination with the exceptional scenic quality of the mountains in both the MNP and WAs, and the high project visibility from these elevated viewpoints, would result in a high overall sensitivity rating.

KOP 9: Umberci Mine. KOP 9 is a popular hiking destination from Primm and the northern part of the valley, located on the trail to Umberci Mine within the Stateline Wilderness Area.

This KOP represents a sensitive recreational viewpoint at middle-ground distance.

KOP 10: Benson Mine. KOP 10, located in the vicinity of the Benson Mine, is representative of visitors to the MNP using or passing through the east face of Clark Mountain. According to the most recent statistical survey of MNP visitors conducted in 2003 for the National Park Service, an estimated 9% of visitors to the MNP visit the Clark Mountains, 7% use the Clark Mountains as their entry point to the MNP, and 10% use them as their departure point from the Preserve (DOI 2004b). The estimated overall number of visitors to the MNP in 2007 was 576,840 (DOI 2008b). Based on the visitor survey estimates, the number of annual visitors represented by this KOP (i.e., those visiting Clark Mountain) would thus be approximately 51,915 (9%). Since 10% of visitors to the Preserve were estimated to depart the park from Clark Mountain, and the principal access roads such as Yates Well and Colosseum Road are located in the vicinity of KOP 10 on the east face of Clark Mountain, BLM assumes the KOP is reasonably representative of some substantial proportion of these visitors. According to the survey, these visitors include rock climbers, hikers, hunters, and OHV drivers traveling on Yates Well, Colosseum, or other open access roads in the vicinity of the KOP.

This KOP represents an elevated, high sensitivity recreational viewpoint at background distance.

Lucy Gray Mountains

No high-sensitivity recreational destinations or other KOPs were identified in the mountains to the east of the valley. This portion of the viewshed was assigned a moderate level of overall visual sensitivity.

4.13.2 Environmental Consequences

Ratings of existing visual sensitivity and proposed project contrast, dominance, and view blockage were made on the basis of field observation, photo documentation, and study of applicant-prepared visual simulations and other project information. KOP photos were taken with a 35mm camera and fixed 50mm lens, with a resulting horizontal field of view of approximately 40 degrees. This field of view, sometimes referred to as 'normal', approximates the actual field of view experienced in the field if viewed as a 9.5 inch wide image at a reading distance of about 1 foot.

Methodology

To identify and evaluate potential impacts, the following four questions were addressed:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Discussion of AFC Analysis

In both the AFC and subsequent data responses, the applicant applied the BLM Visual Resource Management (VRM) system as the basis of its analysis. However, in both the AFC and subsequent analyses, the applicant incorrectly attributed a Class IV VRM baseline rating to the study area and the two Primm Valley Golf Course KOPs. In addition, the AFC and subsequent Data Response 1D identified the golf course as having a low (visual) sensitivity level.

There is no basis for identifying the site and surroundings as a VRM Class IV area. VRM Classes are formally assigned by BLM as part of a land use plan or plan amendment. Previously, however, no VRM mapping or assignment had been adopted for the area by BLM. The AFC analysis thus refers to Visual Resource Inventory (VRI) classes. As discussed previously, however, BLM subsequently identified the site as VR Inventory Class III in a formal inventory of the study area. BLM's independently-conducted visual inventory also resulted in an evaluation that is consistent with a VRI Class III rating of the area. In general, recreational destinations with high use levels within relatively scenic natural settings such as KOP 1 would not be considered VR Inventory Class IV, the lowest possible rating and one that implies either low viewer sensitivity or low scenic quality, neither of which apply to this site. Viewer sensitivity would generally be considered high due to the recreational activity types and high use numbers present. Similarly, BLM disagrees with the applicant's project contrast ratings as described in Data Response 1A # 97-2, as indicated in the analysis of KOPs 3 and 4, below (CH2M Hill 2008g).

A principal disagreement with the AFC analysis was the omission of sensitive outdoor recreational KOPs outside of the Primm Valley Golf Course. This omission was addressed in Data Response 2A, # 147 with visual simulations developed by the applicant from KOPs selected by BLM (CH2M Hill 2008e). These KOPs were not analyzed by the applicant in the Data Responses, but are analyzed below.

4.13.2.1 Proposed Project

Construction Impacts

Construction parking and laydown would occur within the units under construction. A 120-acre construction logistics area would be located between Ivanpah 1 and 2, including fabrication buildings. After Ivanpah 3 construction is complete, associated fabrication buildings would be removed and the area restored. In addition, a 257-acre area would be reserved for temporary construction use, and for the permanent substation site. Project construction is estimated to last for 48 months (Data Response Set 1D, # 4)(CH2M Hill 2008d).

During construction, grading of the project phases would result in a very large area of disturbed soil surface, resulting in high color, line and texture contrast that would be prominent from the highway and elevated KOPs. The potential overall affected area of the three proposed project phases would be approximately 4 square miles or 3,613 acres. The majority of this area would eventually be transformed into mirror fields, with visual effects analyzed elsewhere in this report. The 120-acre construction area, and any graded or disturbed portions of the 257 acres used for temporary construction activities, however, could continue to have long-term adverse visual impacts. Graded areas could also result in adverse visual effects due to fugitive dust.

Nighttime construction lighting, without adequate mitigation, would likely be visible to campers in the Mojave National Preserve.

These effects together and individually could represent strong visual changes to affected KOPs on I-15 and in the Clark Mountains.

Impact Significance - Anticipated strong visual changes from construction would be incompatible with the moderate overall visual sensitivity of the Ivanpah Valley, as experienced from affected viewpoints on the highway, and the high overall visual sensitivity of viewpoints in the Clark Mountains, and would last for a period of several years. They thus represent a potentially adverse impact.

Mitigation - To address potential long-term impacts of site grading, mitigation measures **BIO-14** and **BIO-27**, as specified for specifically visual concerns in mitigation measure **VIS-3**, Revegetation of Disturbed Soil Surfaces, would be implemented. To address potential light pollution impacts to visitors to the Mojave National Preserve, mitigation measure **VIS-4**, Night Lighting Measures, would be implemented. Impacts from fugitive dust have been addressed in Section 4.1 mitigation measures **AQ-SC3** and **AQ-SC7.**

Residual Impacts After Mitigation - Because of the climatic constraints on successful re-vegetation in this region, it is anticipated that the impacts of disturbed areas of the site could remain substantial for the duration of project construction. However, the majority of grading effects would be replaced by the effects of the project itself, which would obscure the disturbed soil surface in all but the area between Ivanpah 1 and 2. This remaining exposed area of disturbance would contribute to the significant overall contrast of the project in the long term but in itself would occupy a small portion of the view. This residual impact of grading would be reduced in the long term.

With mtigation measure **VIS-4**, Temporary and Permanent Exterior Lighting Measures, light pollution effects from nighttime construction lighting could be reduced. Impacts from fugitive dust have been addressed elsewhere in this EIS and would be reduced with mitigation measures.

Operations Impacts

Adverse Effect on Scenic Vista

Although no designated scenic vistas were identified in the study area, various viewpoints, particularly those in the Clark Mountains within the Mojave National Preserve and Stateline Wilderness Area would qualify as such due both to their very high scenic quality and high levels of recreational use. Both representative KOPs within the Clark Mountains, KOPs 9 and 10, would experience substantial adverse visual effects as a result of the proposed project. Panoramic elevated views of the valley would change from a relatively undisturbed desert floor landscape dominated by striking views of the Ivanpah dry lake bed, to an industrial, highly man-altered one dominated by roughly four square miles of mirror-arrays and 459-foot tall solar collector towers topped with brightly lit receiver units, a large graded area, as well as light rays reflected off of ambient atmospheric dust. The mirror fields would display a high degree of visual unity due to their orientation in large-scale circular patterns of high regularity around the collector towers, lending the view a higher level of visual quality than that of many other forms of intensive development. Reflected light rays, when present, would create striking, tent-like patterns, also with high visual unity, which some viewers might consider attractive or interesting. Nevertheless, since the existing intact natural landscape is considered one of the primary attractions for visitors to these mountains, the resulting dramatic alteration of landscape character, particularly as seen from high sensitivity recreational viewpoints in the Clark Mountains, is considered to represent a substantial adverse visual effect. These effects are discussed in further detail below, in the discussion of individual KOPs 9 and 10.

View corridors to Clark Mountain from Highway I-15 could be considered to be a scenic vista in light of the County scenic designation of Highway I-15 within the Ivanpah Valley. The project would not substantially obstruct these scenic views due to the low height of the mirror fields, and the relatively large distances between the vertical solar towers. However, very bright levels of glare from the receiver units atop the solar power towers, though not anticipated to be hazardous, would appear in the foreground of views of Clark Mountain, resulting in very strong levels of contrast that could strongly alter the character of these views or make viewing difficult.

Damage to Scenic Resources (Rock Outcroppings and Historic Buildings within a State Scenic Highway

The project is adjacent to Highway I-15, which is not listed as an eligible State Scenic Highway. The proposed project would be located in immediate proximity to a large rock-outcropping that is a prominent landmark for viewers throughout the viewshed to background distances. The project would not damage or intrude into views of this rock outcropping but would dramatically alter its visual setting. No other notable scenic features are present on-site. The project would not directly damage any specific scenic resources located within the project site.

Impacts of Structures on Key Observation Points

Ivanpah Valley – Primm Valley Golf Course

As described above, views from within the valley are considered to have moderate overall visual sensitivity, with moderate existing visual quality, moderately high viewer concern, and high viewer exposure. As noted above, this rating is generally consistent with BLM's characterization of the valley as VRI Class III.

KOP 1 – Looking Southwest from Primm Valley Golf Course toward Ivanpah 1, (roughly 1.5 miles). **Figure 4.13-6**.

Review of Applicant's Simulation

The simulation of KOP 1 does not clearly depict the portion of the mirror fields nearest the viewer, which appear in the images as an indistinct area with the same color and texture as the background soils. In fact these would appear as a large field of angular, 12-foot-tall metallic structures with an industrial texture and complex patterns of light and shadow that would accentuate their contrast with the surrounding landscape, lending the facility a distinctly man-made character. This may reflect technical limitations in the visual simulation process. Therefore, the simulation may (unavoidably) understate the actual level of contrast that would be experienced by viewers. Color contrast with the surroundings could be strong depending upon the paint color used, but could be minimized for the arrays facing away from the viewer. The far portion of the mirror fields, in which the mirror surfaces themselves are visible, would appear as distinct, angular structures with highly variable surface color and brightness and a dense, industrial texture. **Figure 4.13-7a**, depicting the Solucar solar thermal project in Seville Spain, illustrates the appearance of these features, including the high color and form contrast of unpainted mirror arrays.

Visible mirror surfaces would not be expected to display visible specular reflection of the sun to the public absent mirror system malfunction. Visible mirror surfaces would display areas of diffuse reflection of sunlight under some conditions. While strongly contrasting with the existing setting, these diffuse reflections have been compared to the sun's reflection on the surface of a lake, and are considered to be a moderate and acceptable level of contrast.

The heated solar receiver units at the top of the power towers would appear brightly lit in daylight. That brightness cannot be accurately depicted in graphic simulations.

Figure 4.13-7b, c and d, photographs of the Solar One project in Dagget, CA, illustrate the variable appearance of the mirror surfaces, including areas of bright specular or spread glare that occur under certain conditions; the potential for soil color contrast beneath the heliostats due to visibility of the soil surface from elevated viewpoints, and the role of heliostat shadow in creating visual contrast. BLM was unable to obtain data from the applicant about likely frequency, duration or intensity of the reflected 'light-ray' effect depicted in the simulations. However, **Figure 4.13-7a** also presents some anecdotal documentary evidence on the appearance of this phenomenon, though not on its frequency or duration. In the absence of light rays, the project would appear less vivid, both less dominant and more purely utilitarian in character, than depicted in the simulations.

As depicted in **Figure 4.13-6**, the project would appear very prominently from this near-middle-ground viewpoint. The 495-foot solar collector towers would introduce strong vertical line and form contrast. This form contrast would be strongly accentuated by the bright illumination of the heated solar collector at the top of each tower, as well as by rays of reflected sunlight when ambient dust particles are present in the surrounding air. The solar collector towers and adjacent air-cooled condenser, as well as the substation and related facilities south of Ivanpah 2, would present a utilitarian, industrial character. The panoramic expanse of mirror arrays would present strong textural contrast with the intact, natural character of the desert floor. Portions of the desert floor below the mirror arrays, where visible, would contrast in hue, brightness and value with surrounding undisturbed soil surfaces, and with the mirror structures themselves. When present, reflected light rays would create a luminous, transparent surface of tent-like form that would to some degree repeat that of the mountain ridgeline, would have a legible form with high unity, and to some observers could be perceived as an interesting and vivid, albeit man-made, sight. At other times in the absence of the light rays, the view of the solar tower and mirror fields would be more purely utilitarian in character, both less dominant and less picturesque. Under sunny conditions, the bright lighting of the solar receiver units would be very conspicuous, and may tend to visually dominate views due to their brightness.

In addition to this strong level of contrast, the project would exhibit strong spatial and scale dominance. The vast scale of the project would be such that it could not be taken in a single view.

The project would not physically block existing scenic views of Clark Mountain but as noted previously would strongly alter their character due to the brightness of the solar receivers, and would interfere with the ability of viewers to look toward the mountain due to strong levels of discomfort glare. This would represent a moderately strong to strong level of view blockage in the direction of Clark Mountain.

These factors together would result in a strong level of overall visual change. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance - In the context of moderate overall visual sensitivity, this strong level of visual change would represent a potentially adverse impact.

Mitigation – Views of the proposed project from the golf course could be partially or substantially screened by perimeter tree plantings. Substantial tall screening would also tend to block the panoramic natural views of the Clark Mountains that are the location's scenic attraction. Partial screening of the project with low-growing trees or tall shrubs could screen views of the mirror fields from within the golf course while leaving views of the Clark Mountains intact. In that case the tower and light rays would also remain visible. Screening only quadrants containing views of the project (northwest to southwest) could leave scenic views eastward over Ivanpah Lake and mountains to the east intact. These measures are described in mitigation measure **VIS- 2.**

Should the project be implemented, this measure would be required if desired by the golf course owner, with input by the owner as described in mitigation measure **VIS-2**. Potential contrast of the mirror arrays could be reduced considerably by painting the non-mirror surfaces in a non-reflective tan or brown color to blend with the visual background of the surrounding terrain and the slopes of the Clark Mountains, as described in mitigation measure **VIS-1**.

Residual Impacts After Mitigation – With mitigation measures **VIS-1** and **VIS- 2**, impacts to viewers at Primm Valley Golf Course could be reduced. If measure **VIS-2** is not implemented, impacts would remain adverse.

KOP 2 – Looking West from Primm Valley Golf Course toward Ivanpah 1, (roughly 1.5 miles). **Figures 4.13-8**.

KOP 1 and 2 represent, in effect, two portions of a single sensitive viewing location, the golf course. The affected field of view at the golf course is too wide to fit into a single photograph; thus two photographs are needed to depict the breadth of the project's effects. Views similar to those represented in KOPs 1 and 2 would, however, be experienced as a single panoramic view from many locations within the golf course. Therefore KOP 2 is analyzed under the preceding discussion of KOP 1, with the same conclusions.

Ivanpah Valley – I-15 Motorists

I-15 views are all located within the valley and have moderate overall visual sensitivity, with moderate existing visual quality, moderately high viewer concern, and high viewer exposure.. Viewer numbers on this segment of highway are extremely high, particularly on Friday evenings and other peak periods, although the recreational destination for the majority of such motorists is Las Vegas rather than the Mojave Desert, thus the level of concern with scenic quality of many motorists is likely to be moderate or low.

KOP 3 – Looking West from I-15 near Yates Well Road (Toward Ivanpah 2 and 3), 2.5 Miles from site (Ivanpah 2). **Figure 4.13-9**.

KOP 4 – Looking West from I-15 near Yates Well Road (Toward Ivanpah 1), 1 Mile from site. **Figure 4.13-10**.

KOP 3 depicts views of Ivanpah 2 and 3 from I-15, near the Yates Well Road interchange south of the Primm Valley Golf Course, at a distance of roughly 2-1/2 miles from Ivanpah 2.

KOP 4, rotated slightly to the left of KOP 3, depicts views of Ivanpah 1 from the same segment of I-15, near the Yates Well Road interchange south of the Primm Valley Golf Course at a distance of roughly 1 mile from Ivanpah 1.

KOPs 3 and 4 are meant to capture the full panoramic field of view of motorists on I-15 at their closest point to the project. KOP 3 is rotated to capture the view of Ivanpah 2 and 3 in relation to the prominent rock outcropping in their visual foreground. KOP 4 is rotated to the left to capture the view of adjoining Ivanpah 1. However, the two photographs together represent different potions of what would be experienced by viewers as one panoramic view.

As depicted in **Figures 4.13-9** and 4**.13-10**, the project would be highly prominent from this near-middle-ground viewpoint. The tall solar collector towers would introduce strong vertical form and line contrast. This form contrast would be strongly amplified by bright illumination of the heated solar receiver at the top of each tower, as well as by light rays of reflected sunlight when ambient dust particles are present in the surrounding air. The mirror arrays would alter the character of the desert floor to a distinctly man-made texture, including the mechanical structures of mirror units closest to the viewer, and the bright, reflective mirror surfaces visible beyond the solar towers. Although the form and line contrast of the mirror arrays would be weak, the textural contrast they would introduce is considered strong due to the vast scale and visual magnitude of the affected area, which is so broad that it could not be seen in one view. Visible areas of disturbed soil between Ivanpah 1 and 2 could contrast sharply in color and brightness with any surrounding undisturbed soil surface.

In addition to this strong level of contrast, the project would exhibit strong spatial and scale dominance. The vast scale of the project would be such that it could not be taken in in a single view.

The project would not physically obstruct existing scenic views of Clark Mountain due to the low height of the mirror fields, and the relatively large distances between the vertical solar power towers. However, the very bright solar receiver units could tend to dominate or even interfere with such views.

The combination of strong contrast, strong spatial and scale dominance, and strong view blockage represent a strong level of overall visual change. The panoramic expanse of man-made texture on the ground plane, together with strong form contrast of 45-story towers and strong color contrast of glowing receivers and mirror surfaces would demand attention, could not be overlooked, and would fundamentally alter the perceived character of the existing landscape from an intact natural to distinctly man-altered setting.

Impact Significance - This strong level of overall visual change would not be compatible with the moderate overall sensitivity level of the Ivanpah Valley as seen by motorists in the visual middle-ground. These effects are thus considered a potentially adverse visual impact.

Review of Contrast Rating of KOPs 3 and 4

From foreground and near-middle-ground viewpoints on I-15, the project would not be consistent with the moderate overall sensitivity level associated with its existing scenic quality, viewer concern, and viewer exposure.

From a visual assessment point of view, there are two somewhat different aspects of visual impact highlighted by the ISEGS project. The method of assessing visual impact applied in this study is oriented toward the preservation of natural landscapes perceived to be of scenic value, as an implicit goal. Thus, the level of project contrast with the baseline landscape *per se* is the measure of impact, rather than the ultimate level of visual quality with the project. These two measures of visual impact are not the same.

From the perspective of ultimate visual quality, it is worth noting that the proposed project as seen from KOPs 3 and 4 would, in addition to strong overall contrast, also exhibit strong visual unity and simplicity, attributes that are generally associated with positive visual quality. This condition is in contrast to scenes of visual disorder and disunity that are generally equated with low visual quality or 'visual blight.' For example, a mining operation or manufacturing facility might present scenes of strong visual disorder and thus, low visual quality or 'blight.' The proposed project, in comparison, would exhibit moderate visual quality and would likely appear more acceptable than many other forms of intensive urban or industrial development.

Thus, within an urban frame of reference, not all viewers would find the project disagreeable or unattractive; indeed, many viewers could find the project interesting to view due to its novelty. Overall, it would exhibit moderate visual quality and preserve scenic (though strongly altered) views. Within an urban frame of reference, this level of impact might be considered acceptable. However, within a landscape conservation-oriented frame of reference, the project would represent a substantial change and impairment of a previously intact natural landscape.

Mitigation – No available mitigation measures were identified to fully address the level of contrast of the project. However, if the project is approved, mitigation measure **VIS-1**, Surface Color Treatment of Structures, would be required to minimize structure contrast, especially of the mirror arrays, to the greatest degree feasible.

Residual Impacts After Mitigation - No measures were identified to fully address impacts. Impacts would remain adverse and unavoidable.

Review of Applicant's Simulations

As discussed above under KOP 1, BLM notes that the simulations of KOPs 3 and 4 do not clearly depict the mirror arrays, which would appear as a large field of angular, 12-foot-tall metallic structures with a distinctly man-made texture in views of Ivanpah 1 due to its proximity to viewers. This may reflect technical limitations in the visual simulation process, and the simulation may (unavoidably) understate the actual level of contrast that would be experienced by viewers. The visible mirror surfaces would appear as distinct, angular structures with highly variable surface color and brightness, including occasional areas of specular glare, and a dense, machinery texture as illustrated in **Figure 4.13-7A.** Again, brightness of solar receivers cannot be reproduced in printed simulations.

KOP 5 - Looking Northwest from I-15 at Nipton Road, 4 Miles from Site. **Figure 4.13-11**.

KOP 5 depicts views of I-15 motorists at their farthest point from the project site, as they enter the Ivanpah Valley from the south at background distance. This viewpoint demonstrates the relatively high degree of visual exposure toward I-15 created by the site's open, eastward sloping terrain. It is meant to illustrate the I-15 experience at the farthest point from the project, and complement KOPs 3 and 4, which depict the nearest point to the project.

Contrast of the project at this farthest viewpoint on I-15 would be moderate, rapidly increasing to strong contrast as motorists progressed northward. Visual exposure to the site is high until motorists reach the Primm Valley Golf Course, which obstructs highway views to the site.

Project dominance would remain moderate (co-dominant) at this distance. Scale and prominence of the mirror fields would be large but co-dominant within the overall field of view.

View blockage would be moderate from this location. The bright solar receivers would strongly attract attention, but would appear largely to the right (east) of Clark Mountain, the principal object of scenic views.

Overall, the project would exhibit moderate visual change from this and other background distance viewpoints.

Impact Significance – Arguably, the majority of motorists on I-15 are not highly concerned with the scenic quality of the setting. However, the very high number of viewers (up to 40,000 per day) makes it difficult to consider this KOP as having low sensitivity; under BLM guidelines, for example, 40,000 vehicles per *year* may indicate a high level of viewer sensitivity (DOI 1987)(H-8410-1). This KOP is analyzed in terms of a moderate overall visual sensitivity rating, including a moderately high level of viewer concern. In addition, the affected segment of I-15 within the project viewshed has been identified by San Bernardino County as a county scenic route, as discussed further under Compliance with Applicable laws and regulations.

Moderate contrast as depicted in this background-distance view would be compatible with its moderate overall sensitivity. However, as motorists progressed northward, visual exposure of the project would remain high and contrast and dominance would increase to strong levels. Although no intermediate locations on Highway I-15 were simulated, for the greater part of the drive between Nipton Road and Yates Well Road, which occurs within the middle-ground distance zone (under 3 miles), contrast would be considered strong, and impacts potentially adverse.

Mitigation – No available mitigation measures were identified to fully address these impacts. However, mitigation measure **VIS-1**, Surface Color Treatment of Structures, would be implemented to minimize structure contrast to the greatest degree feasible.

Residual Impacts After Mitigation – No measures were identified to fully address impacts. Impacts for most of the I-15 exposure within middle-ground (under four miles) distance would thus be adverse and unavoidable.

Review of Applicant's Simulation

Previous comments on the color and texture of the simulated mirror fields also apply in this view. At certain times of day, diffused glare from the mirror surfaces would be prominent, similar to a lake surface in sunlight; at other times it would not, as in this simulation. The color and texture contrast of the nearer portion of the mirror fields would vary greatly depending upon surface treatment. Brightness of solar receivers cannot be reproduced.

Ivanpah Valley – Ivanpah Lakebed

KOP 6 – View of Ivanpah 2 and 3 Looking West Toward Site from Eastern Side of Ivanpah Lake, 4 Miles from Site. **Figure 4.13-12**.

KOP 6 is taken from the most heavily-used access point to the dry lakebed by wind sailors, on the eastern edge of the lakebed at a distance of roughly 4 miles.

Review of Applicant's Simulation

The framing of the view, by focusing on Ivanpah 2 and 3, necessarily omits Ivanpah 1, which would appear to the left of this view and would be closer and more prominent to viewers.

As depicted in **Figure 4.13-12B**, because of distance and the relatively oblique vertical angle of view, the mirror arrays would occupy a narrow portion of the field of view, appearing relatively flat from Ivanpah Lake viewpoints. Form, line and color contrast of the mirror fields would thus be relatively weak. The vertical 459-foot towers and bright glow of solar receivers would have greater line and color contrast but would remain moderate and co-dominant with other features in the view. Light rays, when present as depicted in the simulation, would be prominent, but would remain generally subordinate within the overall view. Based on currently available data, project contrast would range from weak to moderate depending on prevalence of light rays and brightness of solar receivers.

Due particularly to the low, oblique viewing angle, project visual scale and spatial dominance would remain subordinate to other prominent components of the view from this location.

The bright power tower receivers would intrude into views of Clark Mountain. However at this distance they are anticipated to have a moderate level of view intrusion.

Overall visual change would thus be moderate under sunny conditions and weak during cloudy conditions.

Impact Significance – The weak to moderate levels of overall project visual change would be compatible with the moderate overall visual sensitivity of the setting from this viewpoint.

Mitigation – None required.

KOP 7 - Looking Southwest Toward Site from Western Side of Ivanpah Lake, 3 Miles from Site. **Figure 4.13-13**.

KOP 7 is taken from a second heavily-used wind sailing access point on the west side of the lakebed west of I-15, and illustrates the nearer range of viewing conditions existing for lakebed visitors.

Review of Applicant's Simulation

As in KOP 6 above, the framing of the view is oriented to crop out Ivanpah 1, which would appear to the left of this view and in this case would be farther from the viewer than Ivanpah 3, to the right. As in KOPs 1 and 2, 3 and 4, and 6 and 7, the overall horizontal angle of view occupied by the project is too wide to capture in a single photograph.

Similar to KOP 6 the mirror fields would be viewed at a relatively oblique, low angle, reducing their overall prominence in the field of view. The solar receiving towers would be prominent due to the intense brightness of the illuminated solar receivers atop each tower. The overall level of project contrast would range from weak to moderate depending upon prevalence of light rays and brightness of solar receivers. In the presence of light rays as depicted in the simulation, or high levels of receiver illumination, contrast would be moderate.

Both mirror fields and towers would be more visually dominant than at KOP 4 due to greater proximity and correspondingly greater visual magnitude. Based on currently available information on glare, the project structures would be visually co-dominant with other features in the view, including the existing transmission towers.

The bright power tower receivers would intrude into views of Clark Mountain. However at this distance they are anticipated to have a moderate level of view intrusion.

Overall visual change would thus be moderate under sunny conditions and weak during cloudy conditions.

Impact Significance – The weak to moderate levels of overall project visual change would be compatible with the moderate overall visual sensitivity of the setting from this viewpoint.

Mitigation – None required.

Ivanpah Valley - Primm

KOP 8 - Looking South from Primm, 4 Miles from Site. **Figure 4.13-14.**

Primm is a high-volume visitor destination within middle-ground distance of the project, located within the larger moderate sensitivity landscape of the valley. Although scenic views toward the project site exist at the southern edge of Primm and from windows of Whiskey Pete's hotel, overall, viewer exposure and orientation to the project site are considered to be limited. Similarly, viewer concern from this indoor activity-oriented KOP is considered relatively low. Existing visual quality within Primm, dominated by large parking areas and commercial development, is also relatively low. In addition, views toward the project site from this location would be essentially similar to those of KOP 7 (Ivanpah Lake), except from a greater distance (over 4 miles rather than 3 miles). For these reasons, BLM agreed that a simulation from this location would not be required.

Similar to KOP 7, the mirror fields would be viewed at a relatively oblique vertical angle, reducing their overall prominence in the field of view. The solar receiving towers would be prominent due to the intense brightness of the illuminated solar receivers atop each tower. In the absence of reflected light rays, the project structures would remain visually subordinate to other features in the view, including the existing transmission towers, and their overall level of contrast would be weak to moderate. In the presence of light rays as depicted in the simulation, contrast would be moderate.

Due to the oblique angle of view from this location, visual dominance of the project would remain subordinate to other components of the view.

The bright power tower receivers would intrude into views of Clark Mountain. However at this distance they are anticipated to have a moderate level of view intrusion.

Overall visual change would thus be moderate under sunny conditions and weak during cloudy conditions.

Impact Significance – The weak to moderate levels of overall project visual change would be compatible with the moderate overall visual sensitivity of the setting from this viewpoint.

Mitigation – None required.

Clark Mountains

As described previously, views from within the Clark Mountains are considered to have high overall visual sensitivity, with high existing visual quality, high viewer concern associated with their California Desert Protection Act status, and high viewer exposure due to the elevated vista points.

KOP 9 – Looking South from Road to Umberci Mine, 1 Mile from Site. **Figure 4.13-15.**

KOP 9 is located on the trail to Umberci Mine, a popular hiking destination from Primm and the northern part of the Ivanpah Valley, located within the BLM Stateline Wilderness Area.

Review of Applicant's Simulation

Again, the simulation is framed to capture a portion of Ivanpah 3, in the foreground, and Ivanpah 2 farther in the distance, necessarily excluding Ivanpah 1, which would appear to the left of the view. The individual 12-foot-tall mirror units are distinguishable in this simulation. To provide a sense of scale, the towers are 459 feet tall. The backs of the mirror units are assumed in the simulation to be painted in a dark color. As discussed above and depicted in **Figure 4.13-7 B,** the appearance of the visible mirror surfaces would vary widely, from dark blue to bright solar diffuse glare, depending upon time and season. The visibility of mirror reflection would be greater from this and other KOPs within the Wilderness Area than from the valley floor due to the elevated viewer position.

As depicted in **Figure 4.13-15 B**, form, line, color and texture contrast of the project structures would all be strong from this viewpoint. Towers would exhibit strong form and line contrast. The mirror fields would exhibit strong texture contrast with the natural ground plane. The glowing solar collectors and visible areas of mirror surface would exhibit strong color contrast against the ground plane and background mountain slopes. In this particular photograph the existing transmission towers and lines are prominent in the foreground. Nevertheless, long, panoramic views of the site and Clark Mountains remain open and highly scenic from this elevated location.

Due both to relative proximity to the project and the elevated viewing angle, the scale and spatial dominance of the project would be high (dominant). As illustrated in the simulation the project would extend over the entire field of view and could not be taken in in a single view. The brightly lit solar receivers would compete with the mountain peaks and ridges for visual dominance.

Similarly, the bright solar receivers would intrude into, and potentially interfere with, scenic views of the Clark Mountains from a moderate to strong degree depending upon brightness of the solar receivers.

Overall project visual change would thus be strong. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance –This strong level of overall project visual change contrast would not be compatible with the moderate overall visual sensitivity of the Ivanpah Valley, nor with the high overall visual sensitivity of the Stateline Wilderness Area in which this viewpoint is located. This impact is thus considered to be adverse.

Mitigation – No available mitigation measures were identified to adequately address these impacts. However, mitigation measure **VIS-1**, Surface Color Treatment of Structures, would be implemented to minimize structure contrast to the greatest degree feasible.

Residual Impacts After Mitigation - Impacts would remain adverse and unavoidable with implementation of mitigation measures.

KOP 10 – Looking East from Vicinity of Benson Mine, 4 Miles from Site. **Figure 4.13-16**.

KOP 10, located in the vicinity of the Benson Mine, is representative of Mojave National Preserve visitors in the Clark Mountains within the project viewshed. Visitors in the vicinity of the KOP include rock climbers, hunters, OHV drivers on Yates Well, Colosseum and other roads, hikers, and campers estimated to total over 50,000 visitors per year (DOI 2004b; DOI 2008b).

As depicted in **Figure 4.13-16 B**, even at this distance the project would display a strong level of form, line, color and texture contrast, introducing an element of highly man-made character into a wide portion of the field of view. The mirror fields would vary in their appearance from dark blue to bright diffuse glare as illustrated in **Figure 4.13-7 B**. At certain times the mirror arrays could potentially create strong diffuse or spread glare, particularly in the morning if viewed on axis with the sun, and in late afternoon. Bright receiver glare is anticipated during all sunny periods. Potential glare impacts are discussed further under Glare Impacts, below. As noted previously, the project would exhibit a high degree of visual unity and simplicity that could be perceived as less adverse than many other types of development. The project would exhibit moderate, rather than low, overall visual quality. Nevertheless, the character of the existing intact, natural landscape would be strongly altered over a large area to a man-made character, and the project would exhibit strong contrast.

From such elevated viewpoints in the surrounding mountains, the mirror arrays would become a dominant feature in views of the valley, strongly altering a large portion of the field of view.

The project would tend to dominate, but not physically obstruct, scenic views of the valley as seen from high elevations in the mountains. The solar receivers could potentially interfere with the ability to see such views due to strong nuisance glare.

Overall, project visual change would thus be strong. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance – This strong level of contrast would not be compatible with the moderate overall sensitivity of the Ivanpah Valley in its current condition. Implementation of the project would represent a substantial decline in scenic quality of views by MNP visitors. This level of impact is thus considered an adverse visual impact.

Mitigation – No available mitigation measures were identified to fully address these impacts. However, the impacts could be reduced through the following mitigation measures:

Mitigation measure **VIS-1**, Surface Color Treatment of Structures, would be implemented to minimize structure contrast to the greatest degree feasible. In order to minimize color contrast of disturbed soil areas, mitigation measure **VIS-3**, Revegetation of Disturbed Soil Areas, would be implemented. The primary area requiring revegetation would be the large area to be used for construction laydown, and siting of a substation and other operation and support structures, located between Ivanpah 1 and 2. However, other structures including soil berms, shall also require revegetation where soil disturbance is expected to occur.

Residual Impacts After Mitigation – Mitigation measure **VIS-1** would reduce the potential contrast of the non-mirror portions of the heliostat units. Mitigation measure **VIS-3** would reduce the area and level of high contrast from soil disturbance over the long term. However, the larger impact of strong visual contrast and dominance of the mirror arrays, towers and solar receivers could not be mitigated. Impacts would thus remain adverse and unavoidable.

Glare Impacts

Glare is a major issue of concern for the ISEGS project, not only for aesthetic reasons, but for navigation and safety reasons due to the proximity of Highway I-15, and to aircraft flight paths associated with both existing facilities and with the anticipated future Southern Nevada Supplemental Airport to be located a short distance north of the project near Jean, Nevada. Potentially affected receptors would include aircraft, motorists on I-15; hikers, climbers and other visitors in the Clark Mountains; and off-road vehicle (ORV) motorists, wind sailors, hikers and others in the valley.

BLM conducted an independent review of potential glare impacts based on available project data. The results of this review are summarized in detail in Section 4.11. Conclusions on potential glare impacts in this visual analysis are based on that review.

In response to Data Requests 89 and 90, the applicant provided a series of data responses dealing with safety of reflected mirror array light beams, including calculations of beam intensity and safety, intensity of light from the solar receiver units on top of the power towers, and receiver glare safety calculations (DR Set 1, # 89 – 90) (CH2M Hill 2008g).

According to the applicant's data responses, the likelihood of hazard to aircraft from mirror reflection is negligible. Potential hazards or annoyance of mirror reflection to motorists or outdoor recreationists was not directly addressed.

According to Data Response DR 90-1, the potential hazard to motorists on I-15 of glare from the heated solar receiving units atop the towers would also be negligible.

However, a third-party expert review commissioned by the Clark County Department of Aviation (CCDOA) concluded that 'glare from the heliostat mirrors could be a hazard to air navigation (ASRC 2009). CCDOA strongly urged the Energy Commission to study the issue of potential glare on aircraft in more detail (Clark County 2009).

Subsequent to publication of the DEIS, BLM requested additional project data related in particular to possible glare impacts from the solar receiver units atop the power towers. BLM has also conducted additional analysis of the potential health and safety hazards or potential for distraction from both the heliostats and power tower receivers as provided in Section 4.11 of this document. BLM's subsequent independent analysis suggests that solar radiation and light reflected from proposed project heliostats could cause a human health and safety hazard to observers in vehicles on adjacent roadways or air traffic flying above the site, and could cause a distraction of drivers on I-15 that would lead to road hazards and to pilots of aircraft flying over the site. Mitigation measure **TRANS-3** would ensure solar radiation and light from the heliostats does not impair the vision of motorists or pilots traveling near the site and that the potential for exposure of observers does not cause a human health and safety hazard.

Solar radiation and light reflected from proposed project power tower receivers is not expected to pose a human safety or hazard to navigation of vehicles on adjacent roadways or air traffic flying above the site, but could potentially cause a distraction of drivers on I-15 that would lead to road hazards. Mitigation measure **TRANS-4** would ensure glare from power tower receivers does not impair the view of motorists or pilots traveling near the site and that the potential for exposure of observers to light reflected from the power tower receivers is minimized to the maximum extent possible.

With mitigation measure **TRANS-4**, the anticipated level of nuisance from glare of the solar receiving units, however, could remain conspicuous. This level of glare could be dominant and could detract from the public's ability to enjoy views of Clark Mountain from the valley floor. The glare would alter the character of those views, but would not prevent them.

In addition to safety and aesthetic impacts from the mirror arrays and solar receivers, concern was expressed in EIS scoping and in public comments on the DEIS over potential nighttime light pollution impacts of construction or other project night lighting (NPCA 2008a). According to comments of the National Parks Conservation Association, the MNP contains some of the most pristine night sky views in the continental United States, and new artificial lighting may represent a deterioration of that resource. These concerns have been addressed in mitigation measure **VIS-5,** Temporary and Permanent Exterior Lighting Measures. With these measures, shielding of all project lighting, including construction lighting, to prevent upward-directed illumination would be required. However, FAA-required aircraft safety lighting, which is anticipated to include bright strobe lighting atop the 7 project towers, could not be shielded to prevent upwardly directed light. Because the aircraft safety lighting would be visible to visitors within the Mojave National Preserve, this would present an adverse impact that could not be mitigated.

Indirect Impacts

By substantially lowering the prevailing visual quality of its local viewshed, the Ivanpah Valley, the project could have the indirect effect of encouraging additional subsequent development of similar character. Because the relatively intact existing landscape would appear highly compromised after introduction of the ISEGS, the incremental additional impact of other future projects could appear to be less significant than if they were occurring in the current landscape without ISEGS.

Closure and Decommissioning Impacts

After the end of the project's useful life, it would be decommissioned as described in the applicant's Closure, Revegetation, and Rehabilitation Plan, Revision 3 (CH2M Hill 2010). The facility, including heliostats, power towers, transmission lines, and telecommunications lines would be removed, original contours restored, and the site revegetated. However, the removal of the existing facility would leave a very prominent visual impact over the entire site due to the strong color contrast created between graded, disturbed soil areas and undisturbed soil areas in the vicinity of the project site. In addition, revegetation of areas in this desert region are difficult and generally of limited success. Thus, visual recovery from land disturbance of closure and decommissioning would likely occur only over a very long period of time.

Beneficial Impacts

No beneficial impacts in the area of visual resources were identified.

4.13.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

Potential visual impacts resulting from the construction of the ISEGS project would be associated with disturbance of native cover material during site grading, the presence of construction equipment and temporary structures, and use of nighttime lighting. For the proposed project, these factors would have an adverse impact on the viewscape, but would be addressed through the required mitigation measures. The construction of the Mitigated Ivanpah 3 Alternative would result in the same type of impacts. However, the areal extent of the construction-related impacts, and their duration, would be reduced from those associated with the proposed project. Therefore, the mitigation measures developed for the proposed project would likely be effective for the Mitigated Ivanpah 3 Alternative as well.

Operations Impacts

The visual character of the proposed project, as it operated, would have substantial adverse impacts to scenic resources that could not be effectively mitigated.

The visual character of the Mitigated Ivanpah 3 Alternative is presented in a visual simulation in **Figure 4.13-17**. Overall, the large-scale and industrial appearance of the facility under the Mitigated Ivanpah 3 Alternative would still result in the same type and magnitude of adverse visual impacts that were identified for the proposed project. However, several changes in the configuration and structures associated with the Mitigated Ivanpah 3 Alternative would result in reducing the magnitude of those impacts. These changes would include the following:

- The reduction of the number of power tower receivers from seven to three would reduce the visual impact of the towers themselves, any glare associated with them during their operation, and the impact of aircraft safety lighting to visitors in the Mojave National Preserve.
- The reduction of the project footprint, including the 12.5 percent reduction in the acreage of the heliostat fields, would reduce the magnitude of the visual impact of the fields.
- The movement of the northern boundary of Ivanpah Unit 3, by approximately 1900 feet (0.36 miles) would place the facility, as a whole, at a further distance from several sensitive viewpoints, including KOP9 (north of Ivanpah Unit 3), KOP10 (Benson Mine), the Stateline Wilderness, and the Mojave National Preserve.

While the Mitigated Ivanpah 3 Alterative would cause a direct, adverse impact to visual resources, the magnitude of those impacts would be lower for the Mitigated Ivanpah 3 Alternative than for the proposed project.

Closure and Decommissioning Impacts

The source and nature of potential visual impacts resulting from the closure and decommissioning of the ISEGS project would be the same as those associated with construction. These would include the disturbance of native cover material during site grading, the presence of heavy equipment and temporary structures, and use of nighttime lighting. Although these characteristics would create an adverse impact on the viewscape, they would be addressed through the mitigation measures. As with construction, the reduced size of the Mitigated Ivanpah 3 Alternative would result in these impacts being of a smaller magnitude and shorter duration than those associated with the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with visual resources.

4.13.2.3 Modified I-15 Alternative

Construction Impacts

Potential visual impacts resulting from the construction of the ISEGS project would be associated with disturbance of native cover material during site grading, the presence of construction equipment and temporary structures, and use of nighttime lighting. For the proposed project, these factors would have an adverse impact on the viewscape, but would be addressed through the required mitigation measures. The construction of the Modified I-15 Alternative would result in the same type of impacts. The areal extent of the construction-related impacts, and their duration, would be reduced from those associated with the proposed project. However, the impacts would be located closer to viewers on Interstate 15. Overall, the mitigation measures described for the proposed project would likely be effective for the Modified I-15 Alternative as well.

Operations Impacts

The visual character of the proposed project, as it operated, would have substantial adverse impacts to scenic resources that could not be effectively mitigated.

Overall, the large-scale and industrial appearance of the facility under the Modified I-15 Alternative would still result in the same type and magnitude of adverse visual impacts that were identified for the proposed project. However, several changes in the configuration and structures associated with the Modified I-15 Alternative would result in these impacts being different from those associated with the proposed project.

The first change would be a reduction in visual impacts to some viewers due to the reduced size and amount of infrastructure associated with the Modified I-15 Alternative. These changes would include the following:

- The reduction of the number of power tower receivers from seven to three would reduce the visual impact of the towers themselves, any glare associated with them during their operation, and the impact of aircraft safety lighting to visitors in the Mojave National Preserve.
- The reduction of the project footprint, including the 12.5 percent reduction in the acreage of the heliostat fields, would reduce the magnitude of the visual impact of the fields.
- The movement of the northern boundary of the ISEGS facility, by approximately 7,200 feet (1.4 miles) would place the facility, as a whole, at a further distance from several sensitive viewpoints, including KOP9 (north of Ivanpah Unit 3),

KOP10 (Benson Mine), the Stateline Wilderness, and the Mojave National Preserve.

These changes would reduce the magnitude of visual impacts of the Modified I-15 Alternative from those of the proposed project for the viewers located to the north and west of the facility, including viewers in the Mojave National Preserve and the Stateline Wilderness.

The second change would be that the Modified I-15 Alternative would include reconfiguration of Ivanpah Unit 3 approximately four miles to the south, to within 1,000 feet of Interstate 15. In the proposed project, the closest power tower to Interstate 15 would be that associated with Ivanpah Unit 1, which would be located approximately 8,400 feet (1.6 miles) from Interstate 15. In the Modified I-15 Alternative, the power tower associated with Ivanpah Unit 3 would be located approximately 4,800 feet (0.9 miles) from Interstate 15. The closest heliostat fields, which would be located approximately 6,200 feet (1.2 miles) from Interstate 15 in the proposed project, would be located within 1,000 feet (0.2 miles) of Interstate 15 in the Modified I-15 Alternative. The length of the heliostat fields directly adjacent to Interstate 15 would be approximately 9,600 feet (1.8 miles). Therefore, the visual impacts associated with viewers from Interstate 15 would be increased, as compared to the impacts to those viewers under the proposed project.

Closure and Decommissioning Impacts

The source and nature of potential visual impacts resulting from the closure and decommissioning of the ISEGS project would be the same as those associated with construction. These would include the disturbance of native cover material during site grading, the presence of heavy equipment and temporary structures, and use of nighttime lighting. Although these characteristics would create an adverse impact on the viewscape, they would be addressed through mitigation measures. As with construction, the reduced size of the Modified I-15 Alternative would result in these impacts being of a smaller magnitude and shorter duration than those associated with the proposed project. However, the impacts would also be located closer to viewers on Interstate 15.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with visual resources.

4.13.2.4 No Action Alternative

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and could include consideration of another solar project.
- Numerous foreseeable locally cumulative projects were identified within the Ivanpah Valley that may not, individually or cumulatively, conform with guidelines for use under the applicable Multiple Use Class L under the CDCA Plan. These projects have the potential to cause adverse impacts to visual resources within the Ivanpah Valley.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert and elsewhere.

4.13.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

Table 4.13-2
Project Compliance with Applicable Laws, Regulations, and Supplemental Authorities

Applicable Laws or Regulations	Consistency without Mitigation Measures	Consistency with Mitigation Measures Impemented
Federal		
National Environmental Policy Act	As discussed above, applicable federal requirements for visual impact assessment are enacted through application of the BLM VRM methodology, discussed below.	
Federal Land Policy and Management Act of 1976	Section 102 (a) of the FLPMA states that "…the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values…" Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) ...." Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will... minimize damage to the scenic and esthetic values...."	Refer to CDCA discussion, below.

Applicable Laws or Regulations	Consistency without Mitigation Measures	Consistency with Mitigation Measures Impemented
California Desert Conservation Area Plan	The CDCA Plan represents the RMP for the area required under FLPMA. The CDCA Plan did not contain VRM mapping as in most RMPs. VR Inventory mapping was prepared prior to this project by BLM. The ISEGS site is classified in the CDCA Plan as MUC L (Limited Use). Multiple-Use Class L, the most restrictive under the plan, “protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished. Under the CDCA Plan Electrical Power Generation Facilities, including Wind/Solar facilities, may be allowed within MUC Class L if NEPA requirements are met.	Consistent. Solar electrical generation plants are specifically allowed for under the MUC Class L Guidelines if NEPA requirements are met. Disclosure of potential visual project effects under NEPA has been conducted through the analysis in this study.
Northern and Eastern Mojave Plan Amendments	The NEMO plan amendments to the CDCA Plan did not directly affect visual resource management. The NEMO identified visual impacts to viewers on historic routes. However, the only identified historic trail in the vicinity, the East Mojave Heritage Trail, would not be impacted by the ISEGS project (Murray, Tel. Con. 9/23/08).	Consistent with stated visual concerns. The East Mojave Heritage Trail would not be directly, adversly affected.
National Historic Preservation Act	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property’s “…setting… (or) feeling…” in a way that affects the property’s eligibility for listing, may result in a potentially significant adverse effect. “Examples of adverse effects…include…Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property’s significant historic features…“ (36 CFR Part 800.5)	Potentially eligible pre-historic and historic sites were identified by BLM within the viewshed of the ISEGS project, and may potentially be affected by visual effects of the project. These potential impacts are addressed in Section 4.4.

Applicable Laws or Regulations	Consistency without Mitigation Measures	Consistency with Mitigation Measures Impemented
State		
State Scenic Highway Program (CA. Streets and Highways Code, Section 260 et seq.)	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform with requirements of the State program.	Consistent. Highway I-15 within the project viewshed is not an eligible or designated State scenic highway.
Local		
County of San Bernardino General Plan		The San Bernardino County General Plan is not applicable to projects located on Federal lands.
Night Sky Protection Ordinance Ord. 3900 (San Bernardino County Code 87.0921)	Commercial and industrial outdoor lighting must be fully shielded, "so that no light is emitted above the horizontal plane…do not direct light or light trespass onto adjacent property…or to any member of the public who may be traveling on adjacent roadways…"	Consistent with mitigation measure **VIS-4.** FAA aircraft lighting could not be shielded.

4.13.4 Mitigation Measures

Surface Treatment of Project Structures and Buildings

VIS-1 The project owner shall treat the surfaces of all project structures and buildings visible to the public, other than surfaces that are included to direct or reflect sunlight, such that a) their colors minimize visual intrusion and contrast by blending with the existing tan and brown color of the surrounding landscape; and b) their colors and finishes do not create excessive glare. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive.

The project owner shall submit for CPM review and approval, a specific Surface Treatment Plan that will satisfy these requirements.

Verification: At least 90 days prior to specifying to the vendor the colors and finishes for each set of structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to BLM's Authorized Officer and the CPM for review and approval and simultaneously to San Bernardino County for review and comment. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a plan with the specified revision(s) for review and approval by BLM's Authorized Officer and the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to BLM's Authorized Officer and the CPM for review and approval. BLM's Authorized Officer and the CPM shall review and approve the Surface Treatment Plan or identify any material deficiencies within thirty (30) days of receipt.

The treatment plan shall include:

A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. A specific schedule for completion of the treatment; and

E. A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by BLM's Authorized Officer and the CPM. Subsequent modifications to the treatment plan are prohibited without BLM's Authorized Officer and the CPM approval.

Prior to the start of commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit to each one set of electronic color photographs from the same key observation points identified in (d) above. The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.

Landscape Screening of Golf Course

VIS-2 At the request of, and in consultation with BLM's Authorized Officer, the CPM, and the golf course owner, the project owner shall prepare a perimeter landscape screening plan to reduce the visibility of the proposed ISEGS project as seen from the golf course. The purpose of the plan shall be to provide screening of the power project, particularly the mirror fields, while retaining as much of the scenic portion of the overall views of Ivanpah Valley and Clark Mountains as feasible. The design approach shall be developed with prior consultation with the golf course owner, and implemented only at the golf course owner's request. The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment a preliminary conceptual landscaping plan whose objective is to provide an attractive visual screen to views of the ISEGS project mirror fields. Upon approval by BLM's Authorized Officer and the CPM and golf course owner, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment a landscaping plan whose proper implementation will satisfy these requirements.

The plan shall not be implemented until the project owner receives final approval from BLM's Authorized Officer and the CPM.

Verification: The landscaping plan shall be submitted to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment at least 90 days prior to installation of the landscaping. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM and simultaneously to the golf course owner a revised plan for review and approval by BLM's Authorized Officer and the CPM. The plan shall include:

A. A detailed landscape, grading, and irrigation plan, at a reasonable scale. The plan shall demonstrate how the requirements stated above shall be met. The plan shall provide a detailed installation schedule demonstrating installation of as much of the landscaping as early in the construction process as is feasible in coordination with project construction.

B. A list (prepared by a qualified professional arborist familiar with local growing conditions) of proposed species, specifying installation sizes, growth rates, expected time to maturity, expected size at five years and at maturity, spacing, number, availability, and a discussion of the suitability of the plants for the site conditions and mitigation objectives, with the objective of providing the widest possible range of species from which to choose;

C. Maintenance procedures, including any needed irrigation and a plan for routine annual or semi-annual debris removal for the life of the project;

D. A procedure for monitoring for and replacement of unsuccessful plantings for the life of the project; and

E. One set of 11"x17" color photo-simulations of the proposed landscaping at five years and twenty years after planting, as viewed from adjoining segments of I-15.

The plan shall not be implemented until the project owner receives final approval from BLM's Authorized Officer and the CPM.

The planting must occur during the first optimal planting season following site mobilization. The project owner shall simultaneously notify BLM's Authorized Officer and the CPM and the golf course owner within seven days after completing installation of the landscaping, that the landscaping is ready for inspection.

The project owner shall report landscape maintenance activities, including replacement of dead or dying vegetation, for the previous year of operation in each Annual Compliance Report.

Revegetation of Disturbed Soil Areas

VIS-3 The project owner shall revegetate disturbed soil areas to the greatest practical extent, as described in mitigation measures **BIO-14 and BIO-27**. In order to address specifically visual concerns, the required Closure, Revegetation and Rehabilitation Plan shall include reclamation of the area of disturbed soils used for laydown, project construction, and siting of the substation and other ancillary operation and support structures.

Verification: Refer to mitigation measures **BIO-14 and BIO-27**.

Temporary and Permanent Exterior Lighting

VIS-4 To the extent feasible, consistent with safety and security considerations, the project owner shall design and install all permanent exterior lighting and all temporary construction lighting such that a) lamps and reflectors are not visible from beyond the project site, including any off-site security buffer areas; b) lighting does not cause excessive reflected glare; c) direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; d) illumination of the project and its immediate vicinity is minimized, and e) the plan complies with local policies and ordinances. The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the County of San Bernardino for review and comment a lighting mitigation plan.

Verification: At least 90 days prior to ordering any permanent exterior lighting or temporary construction lighting, the project owner shall contact BLM's Authorized Officer and the CPM to discuss the documentation required in the lighting mitigation plan. At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the County of San Bernardino for review and comment a lighting mitigation plan. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM. BLM's Authorized Officer and the CPM shall approve or identify any material deficiencies in the Lighting Plan within 30 days following receipt of the Plan.

The Lighting Plan shall include the following:

A. Location and direction of light fixtures shall take the lighting mitigation requirements into account;

B. Lighting design shall consider setbacks of project features from the site boundary to aid in satisfying the lighting mitigation requirements;

C. Lighting shall incorporate fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

D. Light fixtures that are visible from beyond the project boundary shall have cutoff angles that are sufficient to prevent lamps and reflectors from being visible beyond the project boundary, except where necessary for security;

E. All lighting shall be of minimum necessary brightness consistent with operational safety and security; and

F. Lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.

The project owner shall not order any exterior lighting until receiving BLM Authorized Officer and CPM approval of the lighting mitigation plan.

Prior to commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that the lighting has been completed and is ready for inspection. If after inspection, BLM's Authorized Officer and the CPM notify the project owner that modifications to the lighting are needed, within 30 days of receiving that notification the project owner shall implement the modifications and notify BLM's Authorized Officer and the CPM that the modifications have been completed and are ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide BLM's Authorized Officer and the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify BLM's Authorized Officer and the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution report shall be submitted to BLM's Authorized Officer and the CPM within 30 days.

4.13.5 Summary

The proposed project would result in a direct adverse impact to existing scenic resource values as seen from several Key Observation Points in the Ivanpah Valley and Clark Mountains, including:

- The Primm Valley Golf Course;
- Middle-ground-distance viewpoints on Highway I-15;
- Viewpoints in the Mojave National Preserve, throughout the east face of Clark; and Mountain
- Viewpoints in the Stateline Wilderness Area, including the Umberci Mine and vicinity.

The visual impacts associated with the project would be viewed by visitors to the Mojave National Preserve and two designated wilderness areas, and a land-sailing site of regional or greater importance. The potential effects involve the unique scenic characteristics of the local landscape as indicated by the national park and wilderness designations of portions of the project viewshed; concerns expressed by public commentors to date; and a degree of uncertainty as to the level of discomfort or disability glare from the solar tower receivers.

Some of the adverse visual impacts, such as those associated with the Primm Valley Golf Course (KOPs 1 and 2), could be reduced through implementation of mitigation measures. However, potentially adverse visual impacts at the other locations cited above could not be reduced through mitigation, and would thus result in unavoidable adverse impacts.

Because the project has the potential to result in exposure of aircraft pilots, motorists, and hikers to solar radiation reflected from project heliostats and/or power tower receivers, mitigation measures **TRANS-3** and **TRANS-4** would ensure that potential glare from the project is minimized to the extent possible and does not pose a health and safety risk. The solar receiver units atop the solar power towers would generate conspicuously bright levels of glare for foreground viewers. Even with mitigation measures, glare, while not representing a hazard, could represent a visually dominant feature as seen from the viewpoints named above. Remaining glare could alter the character of views of Clark Mountain from the valley floor, affecting the public's ability to enjoy those views, though not preventing them.

The project, in combination with foreseeable future projects, could also result in adverse and unavoidable cumulative visual impacts of two kinds:

1. Cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Ivanpah Valley; and
2. Cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Mojave Desert.

The analysis establishes that the proposed project would represent a substantial change and impairment of a natural landscape that is largely intact. However, within an urban frame of reference, not all viewers would find the project disagreeable or unattractive; indeed, many viewers could find the project interesting to view due to its novelty. Overall, it would exhibit a moderate level of visual quality and would leave scenic views of Clark Mountain unobstructed physically, though strongly impaired by glare. Within an urban frame of reference, where preservation of natural landscapes is not a primary goal, this level of impact might be considered acceptable.

This fact may be relevant within the context of the cumulative impact scenario foreseen within the Ivanpah Valley, since development of any of the proposed renewable energy projects, or a preponderance of other foreseeable projects, would result in such an urbanized setting. If a number of the foreseeable cumulative projects are developed, the Ivanpah Valley landscape would, with or without the ISEGS project, quickly reach a point at which the level of scenic intactness is impaired to a *de facto* VR Class IV, low visual quality and sensitivity condition, becoming an urbanized environment, in apparent conflict with the area's Multiple-Use Class L status under the CDCA Plan and the County of San Bernardino's scenic highway policies.

As stated previously, the project would result in unavoidable adverse impacts. However, mitigation measures would minimize impacts to the greatest feasible extent.

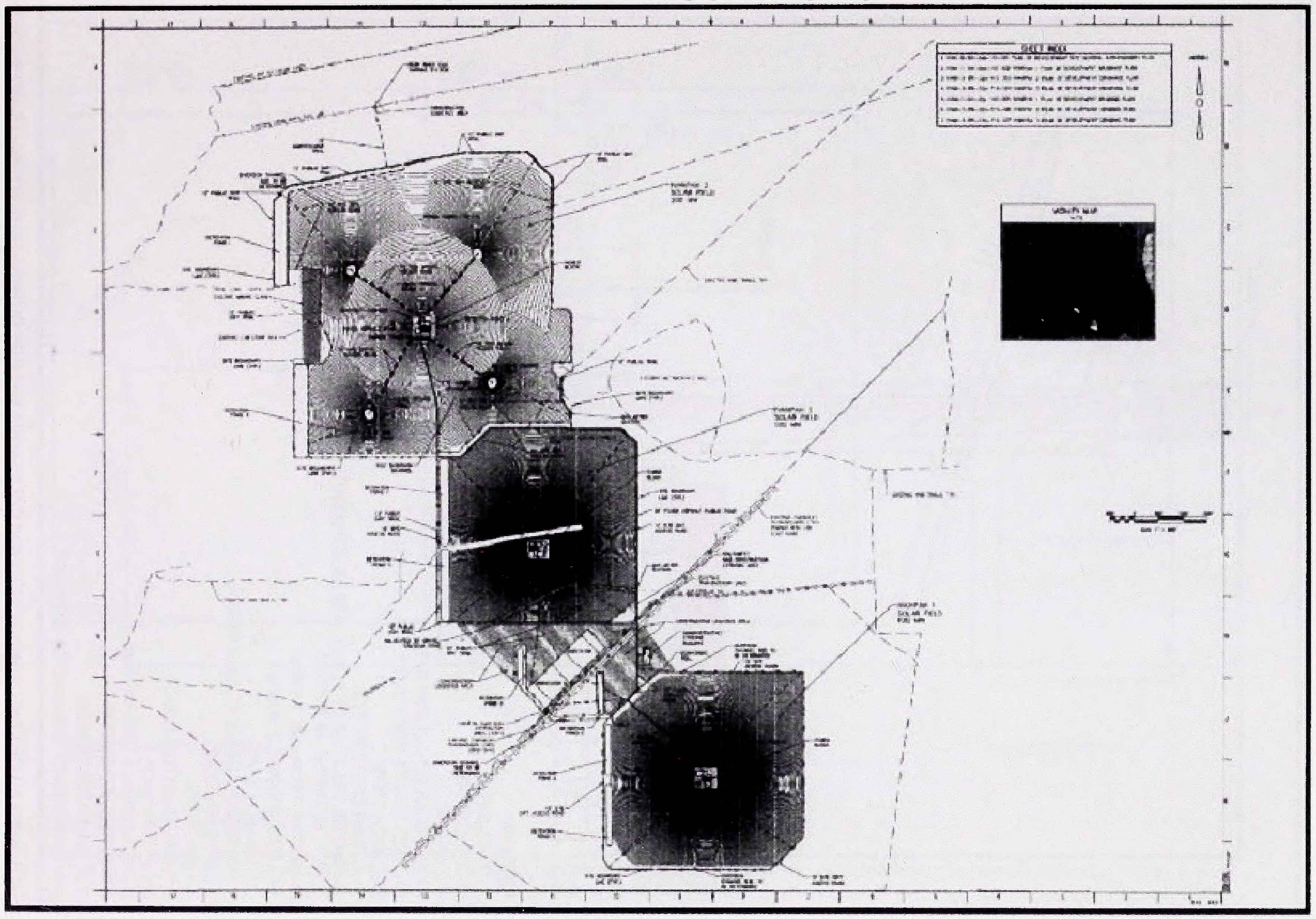
Overall, the Mitigated Ivanpah 3 Alternative would have the same adverse impacts that would be associated with the proposed project. However, the magnitude of these impacts would be reduced due to the reduction in the number of power tower receivers, the reduction of the size of the heliostats fields, and the movement of the northern boundary of the facility further from sensitive viewing locations.

The Modified I-15 Alternative would also have the same type of adverse impacts that would be associated with the proposed project. To viewers located in the Mojave National Preserve and Stateline Wilderness to the west and north of the facility, the magnitude of these impacts would be reduced due to the reduction in the number of power tower receivers, the reduction of the size of the heliostats fields, and the reconfiguration of Ivanpah Unit 3. However, the reconfiguration of Ivanpah Unit 3 four miles to the south, to a location directly adjacent to Interstate 15, would increase the magnitude of visual impacts to viewers on Interstate 15.

Table 4.13-3
Comparison of Visual Resources Impacts

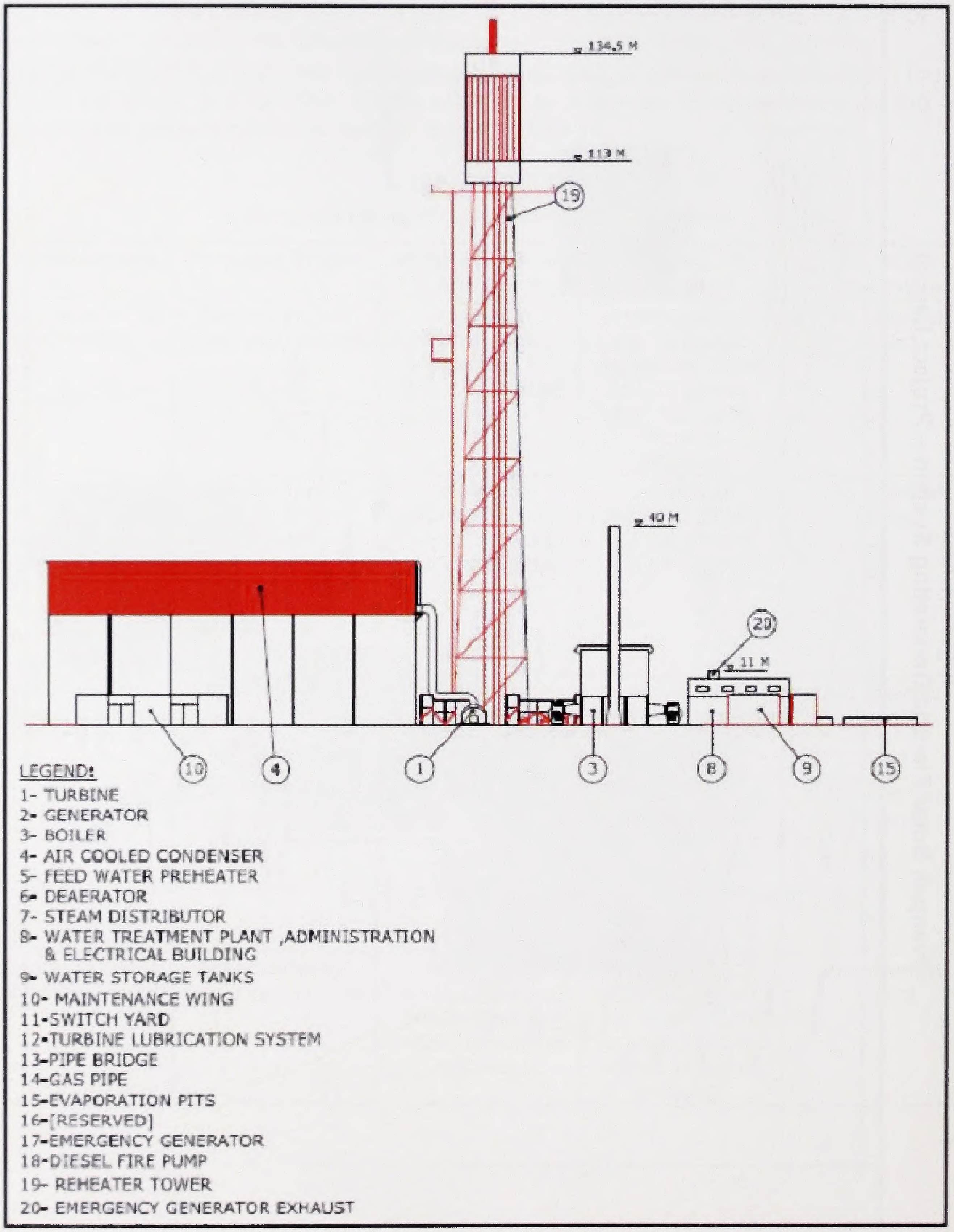
Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Appearance during construction	Adverse impact, would be mitigated	Lower than proposed project, greater than No Action. Would be mitigated	Lower magnitude than proposed project, but closer to I-15, greater than No Action. Would be mitigated	No potential impact
Appearance from sensitive viewing points in Mojave National Preserve and Stateline Wilderness (daytime view and night lighting)	Adverse impact, would not be mitigated.	Lower than proposed project, but still adverse and unmitigable	Lower than proposed project, but still adverse and unmitigable	No potential impact
Appearance from Interstate 15	Adverse impact, would not be mitigated.	Lower than proposed project, but still adverse and unmitigable	Higher than proposed project, adverse and unmitigable	No potential impact
Glare	Difficult to predict. To be evaluated by monitoring.	Difficult to predict, but lower than proposed project. To be evaluated by monitoring.	Difficult to predict, but higher than proposed project for viewers on I-15. To be evaluated by monitoring.	No potential impact
Appearance during decommissioning	Adverse impact, would be mitigated	Lower than proposed project, greater than No Action. Would be mitigated	Lower than proposed project, but closer to I-15 greater than No Action. Would be mitigated	No potential impact

Figure 4.13-1
Ivanpah Solar Electric Generating System – Project Layout



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: DATA RESPONSE (DR) SET2A, DR 130-2, "PLAN of Development sitegeneral arrangement plan. _IVAN-0-DW-048-111-001."

Figure 4.13-2
Ivanpah Solar Electric Generating System - Project Elevations


≈ 134.5 M
≈ 113 M
19
≈ 40 M
20
≈ 11 M
10
4
1
3
8
9
15
LEGEND:
1- TURBINE
2- GENERATOR
3- BOILER
4- AIR COOLED CONDENSER
5- FEED WATER PREHEATER
6- DEAERATOR
7- STEAM DISTRIBUTOR
8- WATER TREATMENT PLANT ,ADMINISTRATION & ELECTRICAL BUILDING
9- WATER STORAGE TANKS
10- MAINTENANCE WING
11-SWITCH YARD
12-TURBINE LUBRICATION SYSTEM
13-PIPE BRIDGE
14-GAS PIPE
15-EVAPORATION PITS
16-[RESERVED]
17-EMERGENCY GENERATOR
18-DIESEL FIRE PUMP
19- REHEATER TOWER
20- EMERGENCY GENERATOR EXHAUST

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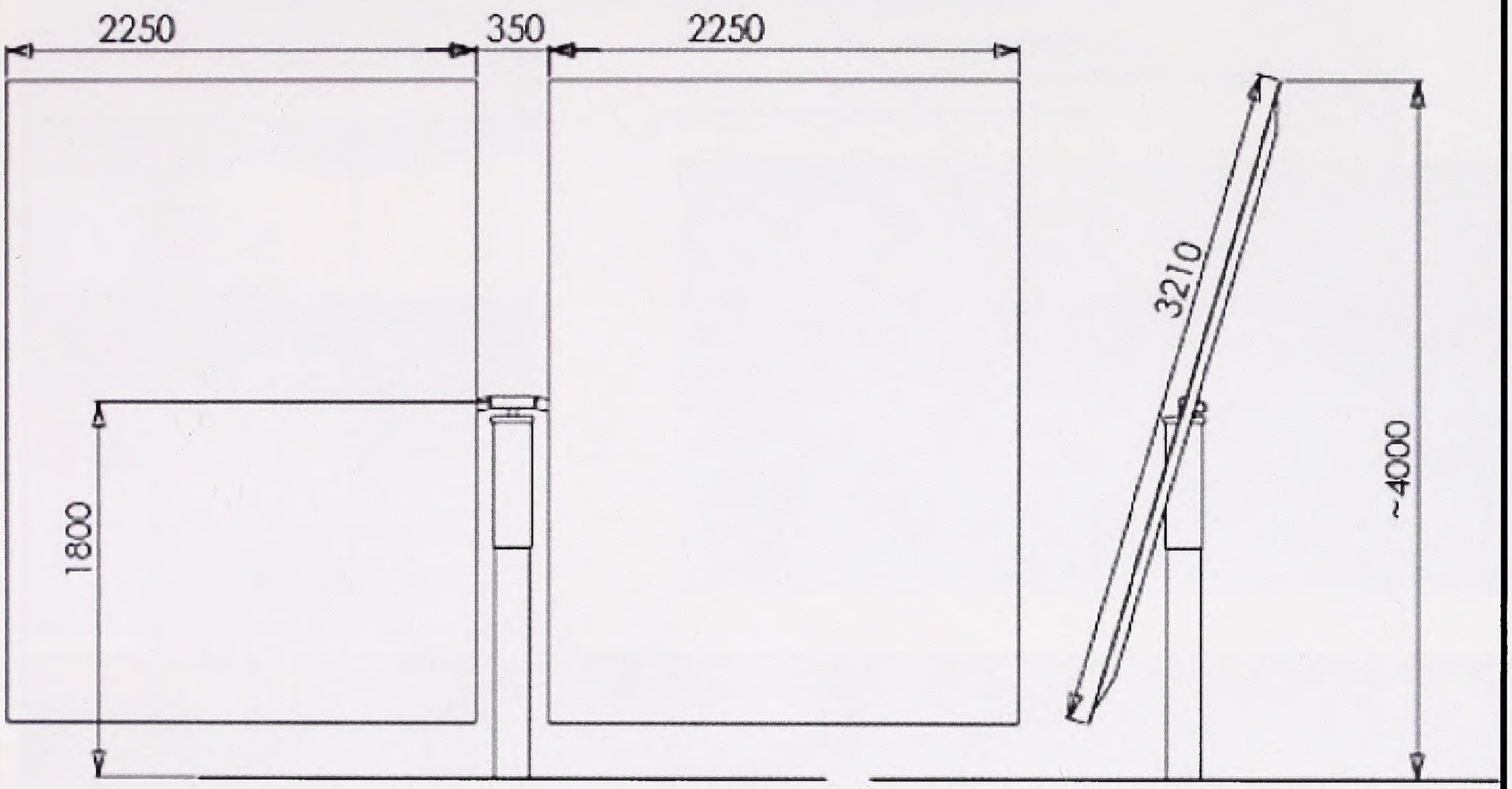
SOURCE: AFC Figure 2.2-C

Figure 4.13-3
Ivanpah Solar Electric Generating System - Mirror Elevations



Double-mirror heliostat

Note: Units are in millimeters.

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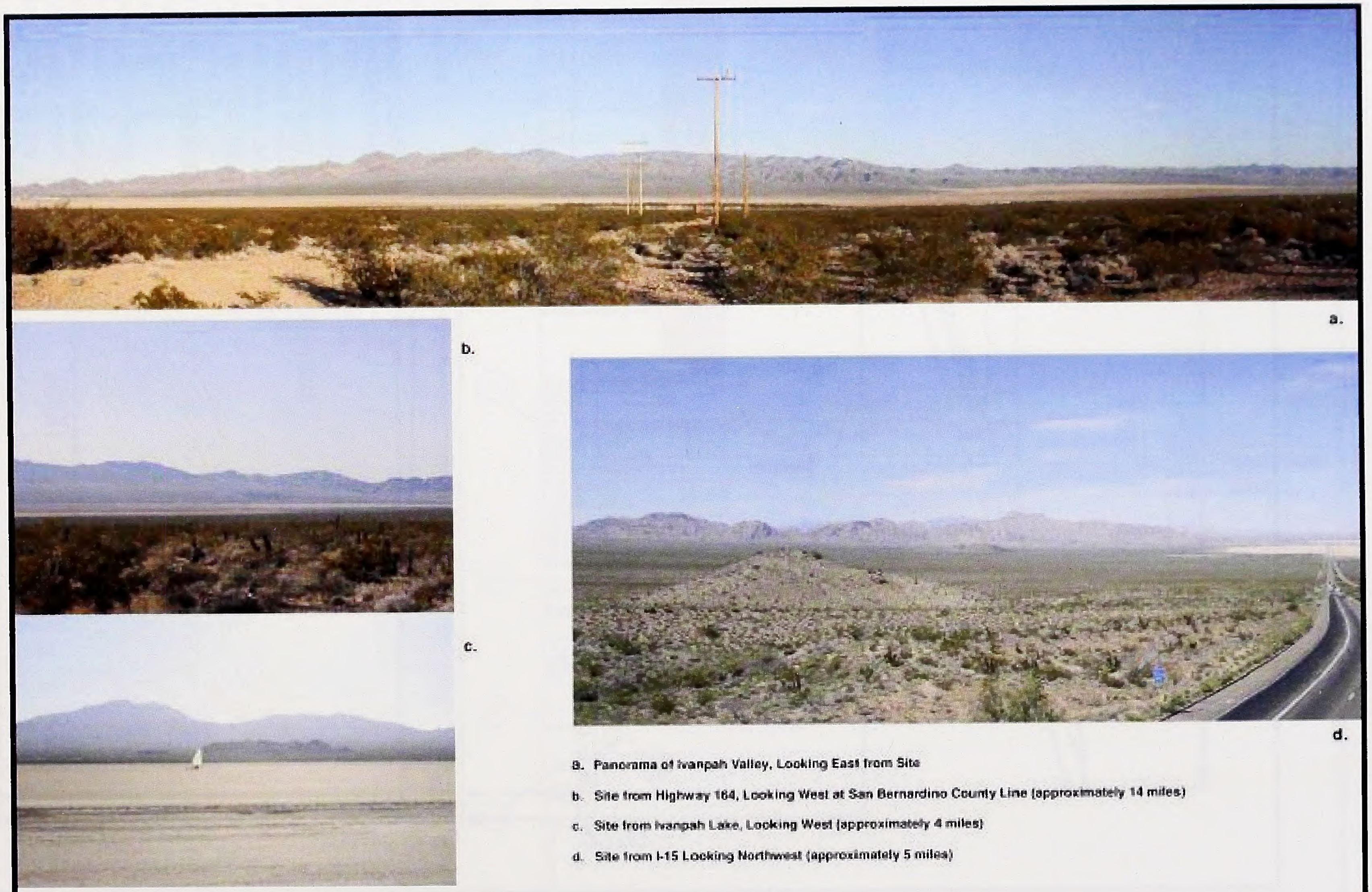
SOURCE: DR SET 1D # 102-1R

Figure 4.13-4
Ivanpah Solar Electric Generating System - Views of Site



a. Panorama of Ivanpah Valley, Looking East from Site

b. Site from Highway 164, Looking West at San Bernardino County Line (approximately 14 miles)

c. Site from Ivanpah Lake, Looking West (approximately 4 miles)

d. Site from I-15 Looking Northwest (approximately 5 miles)

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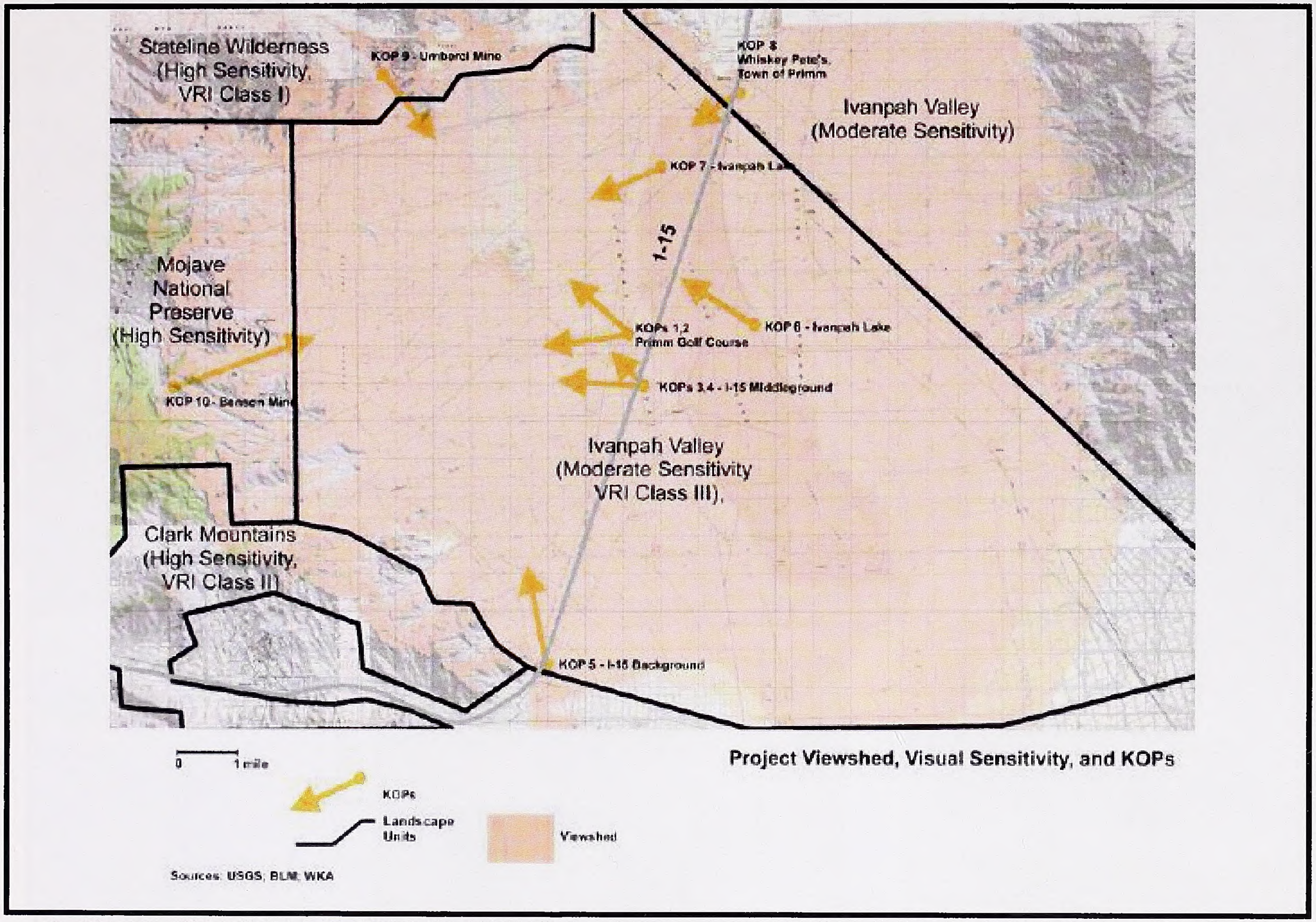
SOURCE: WK Figure 1

Figure 4.13-5
Ivanpah Solar Electric Generating System - Landscape Setting


Stateline Wilderness (High Sensitivity, VRI Class I)
KOP 9 - Umberci Mine
KOP 8 Whiskey Pete's, Town of Primm
Ivanpah Valley (Moderate Sensitivity)
KOP 7 - Ivanpah Lake
I-15
Mojave National Preserve (High Sensitivity)
KOPs 1,2 Primm Golf Course
KOP 6 - Ivanpah Lake
KOPs 3,4 - I-15 Middleground
KOP 10 - Benson Mine
Ivanpah Valley (Moderate Sensitivity VRI Class III),
Clark Mountains (High Sensitivity, VRI Class II)
KOP 5 - I-15 Background
0
1 mile
Project Viewshed, Visual Sensitivity, and KOPs
KOPs
Landscape Units
Viewshed
Sources: USGS, BLM, WKA

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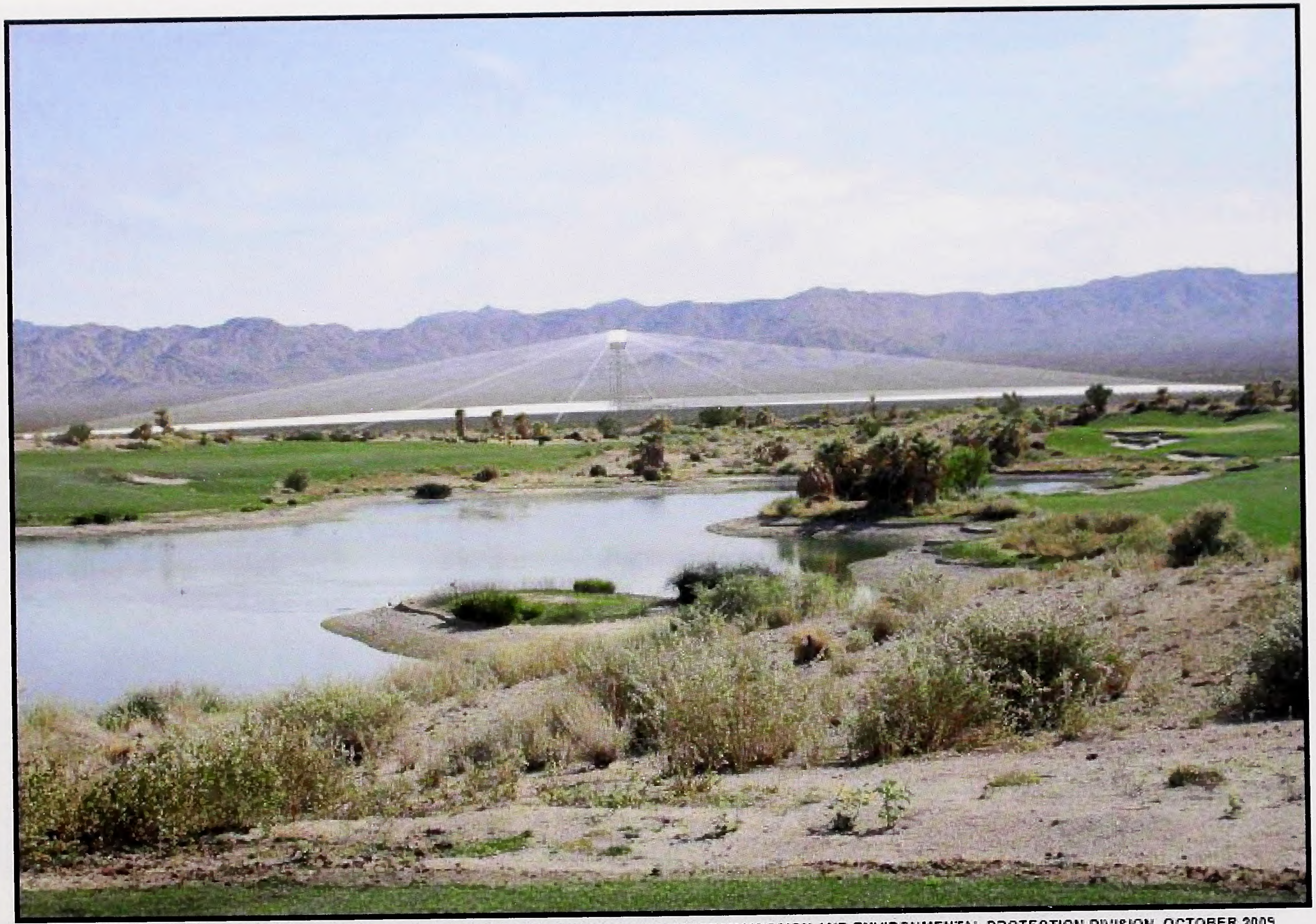
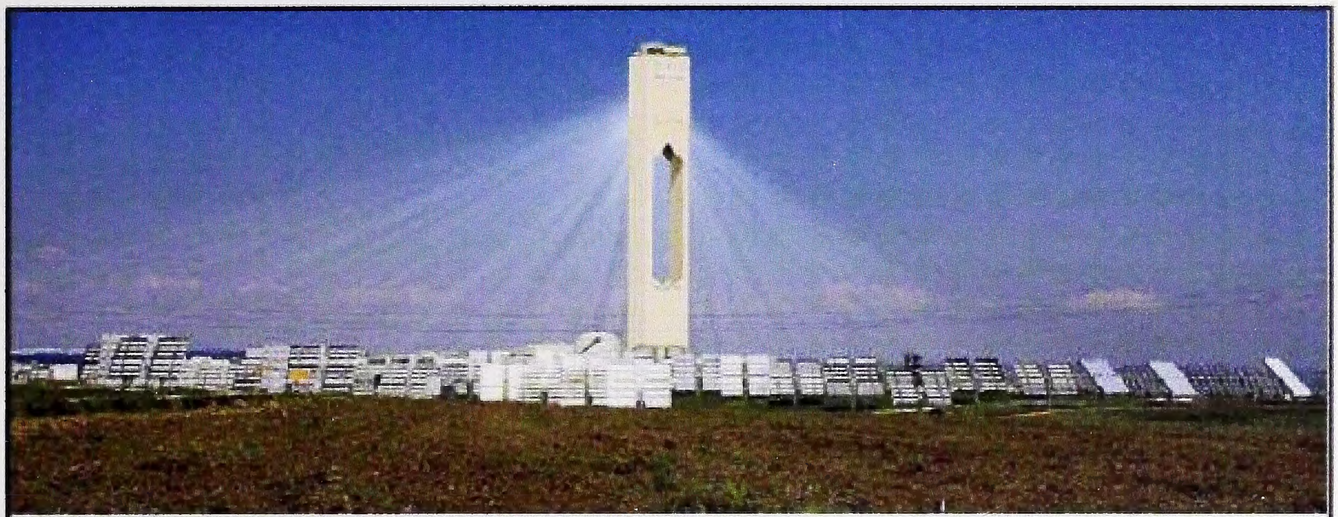
SOURCE: WK Figure 2

Figure 4.13-6
Ivanpah Solar Electric Generating System - Simulation From Golf Course Hole 1

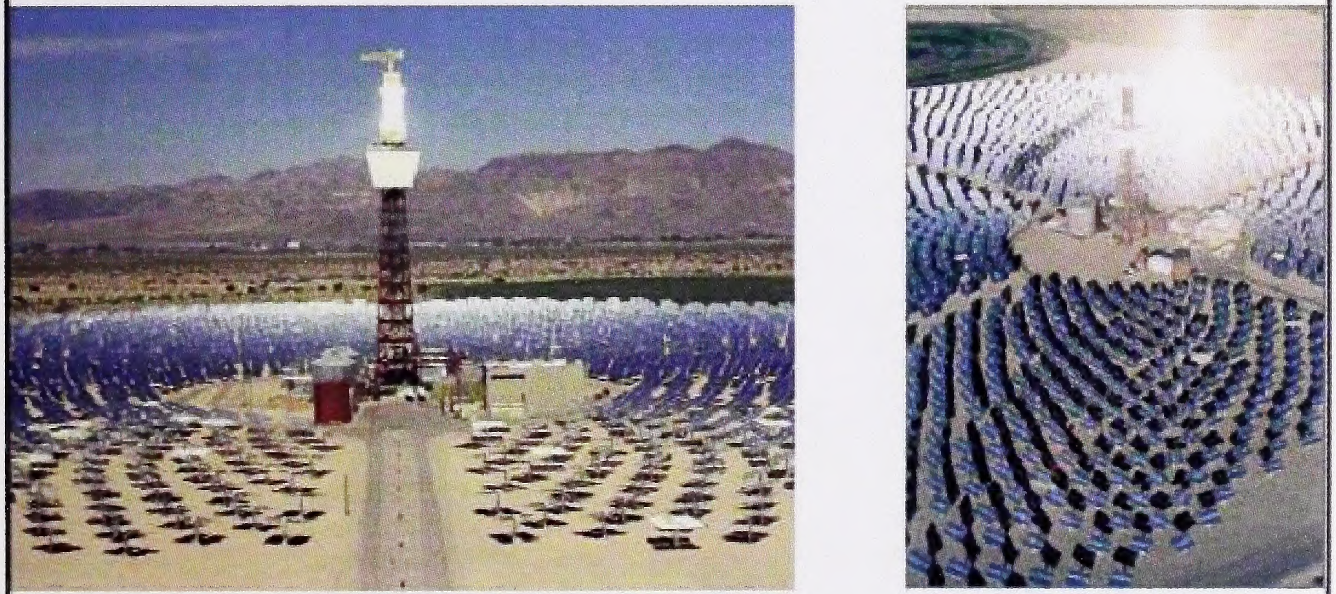


U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: DR1D #102 Figure 5.13-9bR

Figure 4.13-7
Ivanpah Solar Electric Generating System - Solar Thermal Project Example Photos



A. Solúcar Project, Seville, Spain



B. Solar One Project, Dagget, California

C. Solar One Project

D. Solar One Project

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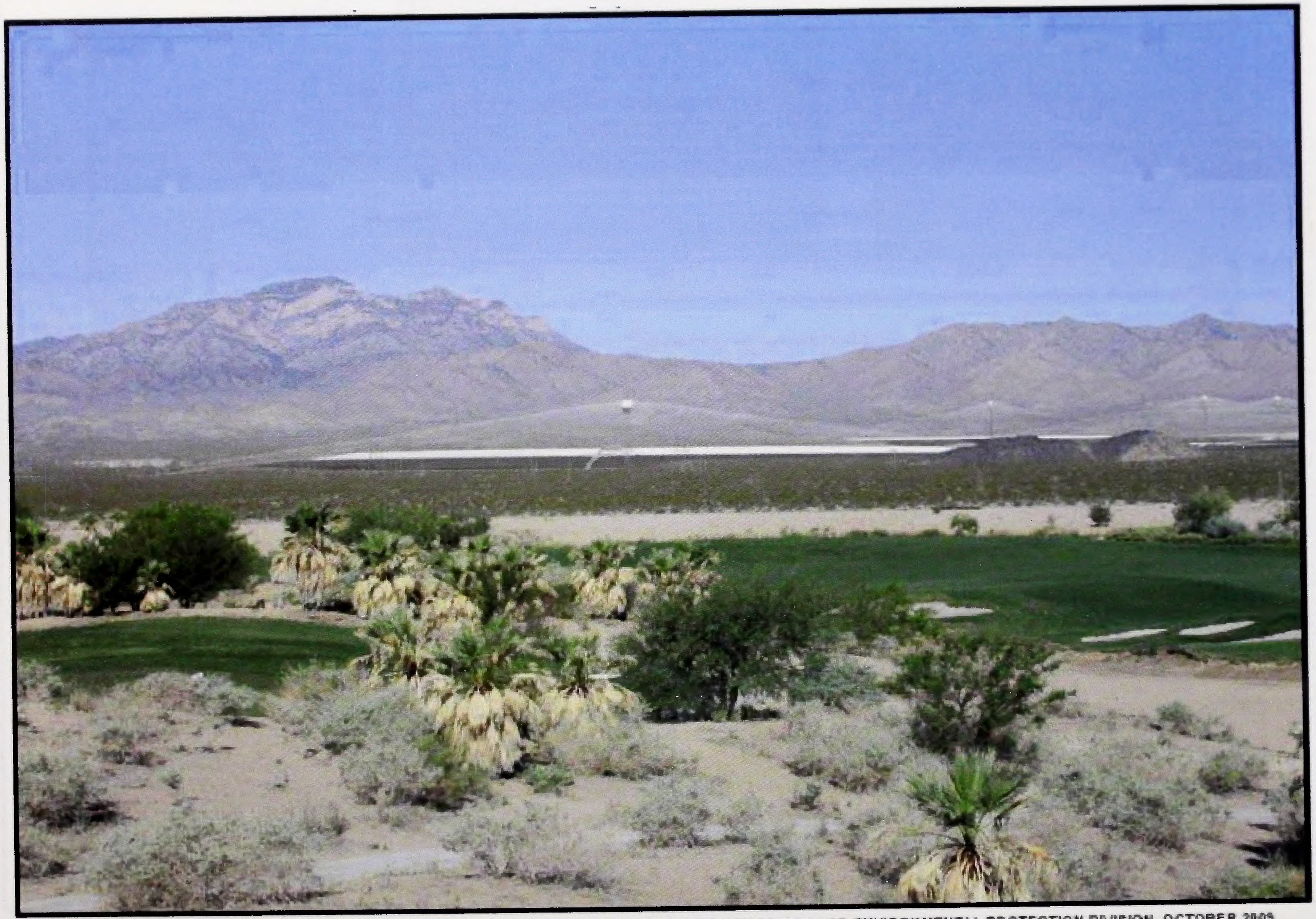
SOURCE: WK Figure 7

Figure 4.13-8
Ivanpah Solar Electric Generating System - Simulation From Golf Course Hole 8



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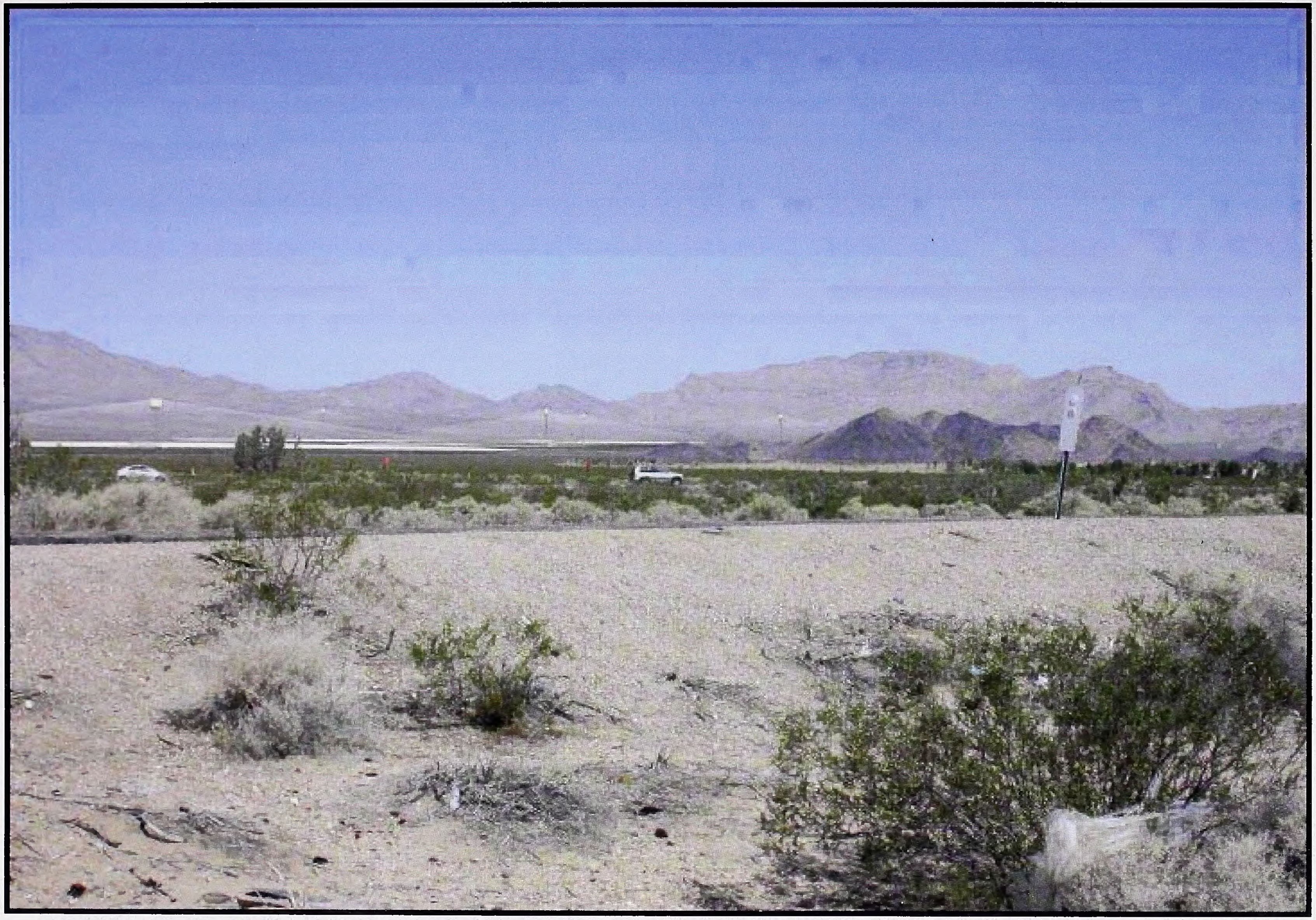
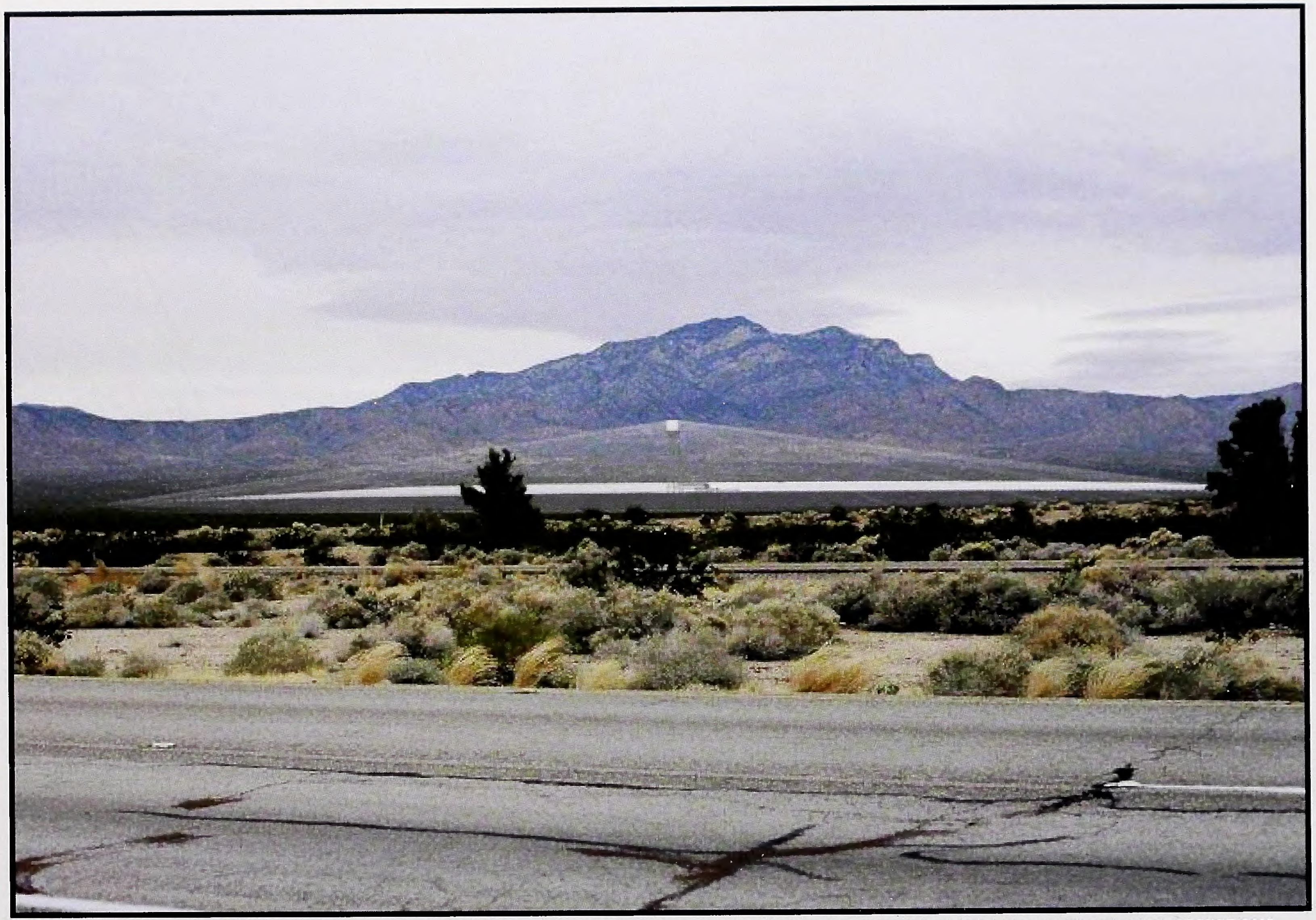
SOURCE: DR 1D #102 Figure 5.13-10bR

Figure 4.13-9
Ivanpah Solar Electric Generating System - Simulation Ivanpah 2, 3 From I-15, Yates Well Road, 2.5 Miles



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: DR 1D #102 Figure DR97-1BR

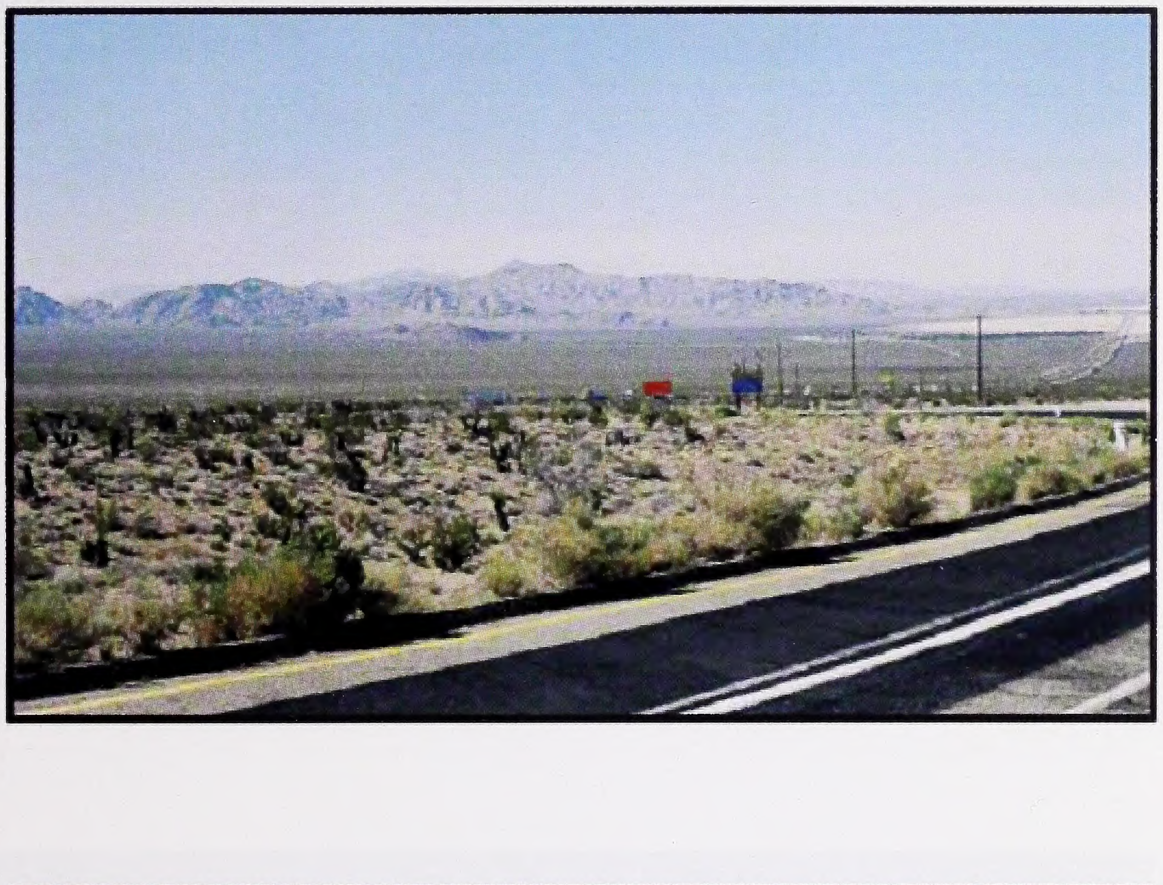
Figure 4.13-10
Ivanpah Solar Electric Generating System - Simulation Ivanpah 1 FR I-15, Yates Well Road, 1 Mile



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2005

SOURCE: DR 1D #102 Figure DR97-2BR

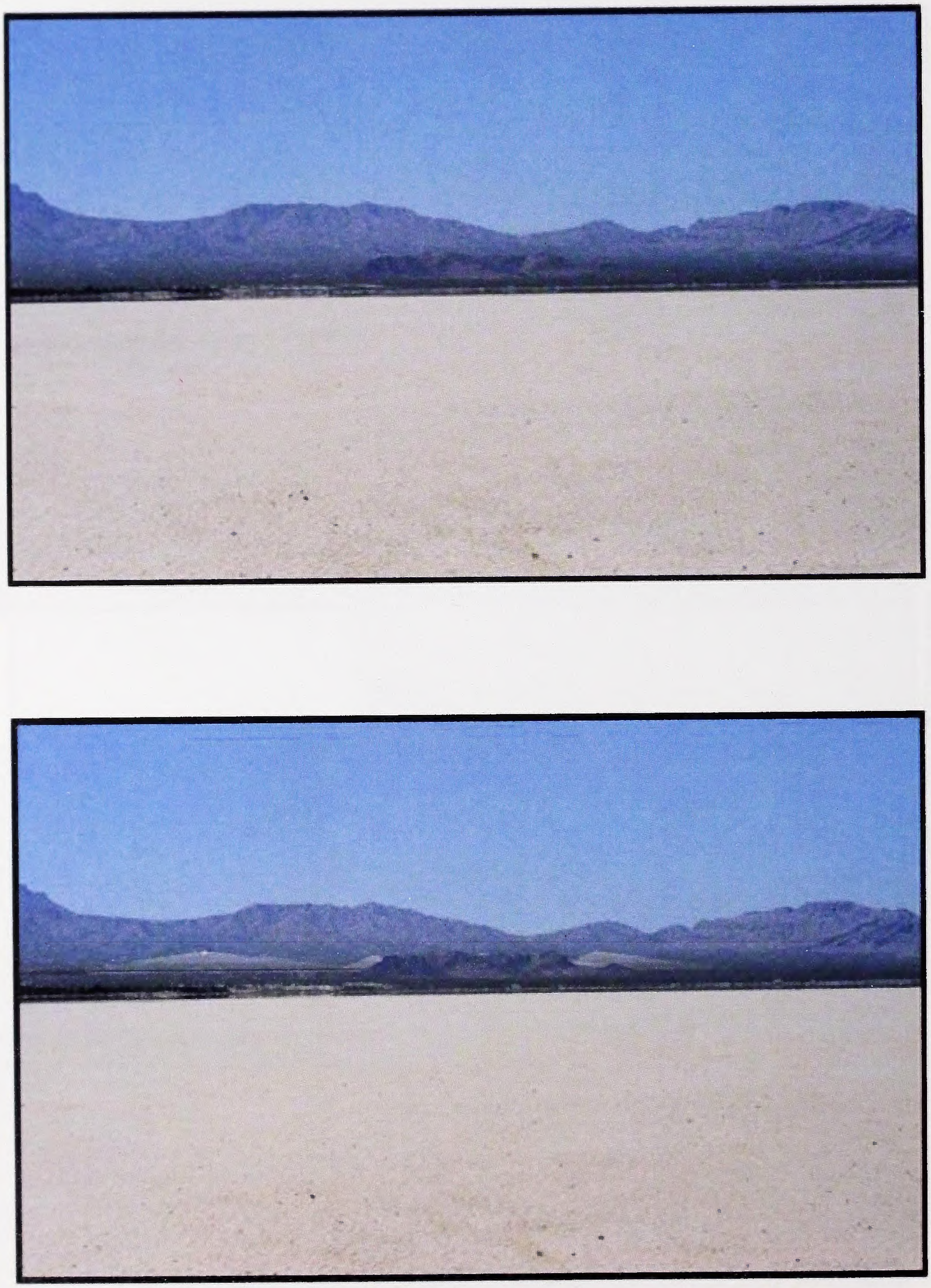
Figure 4.13-11
Ivanpah Solar Electric Generating System - I-15 FR Nipton Road, 4 Miles



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

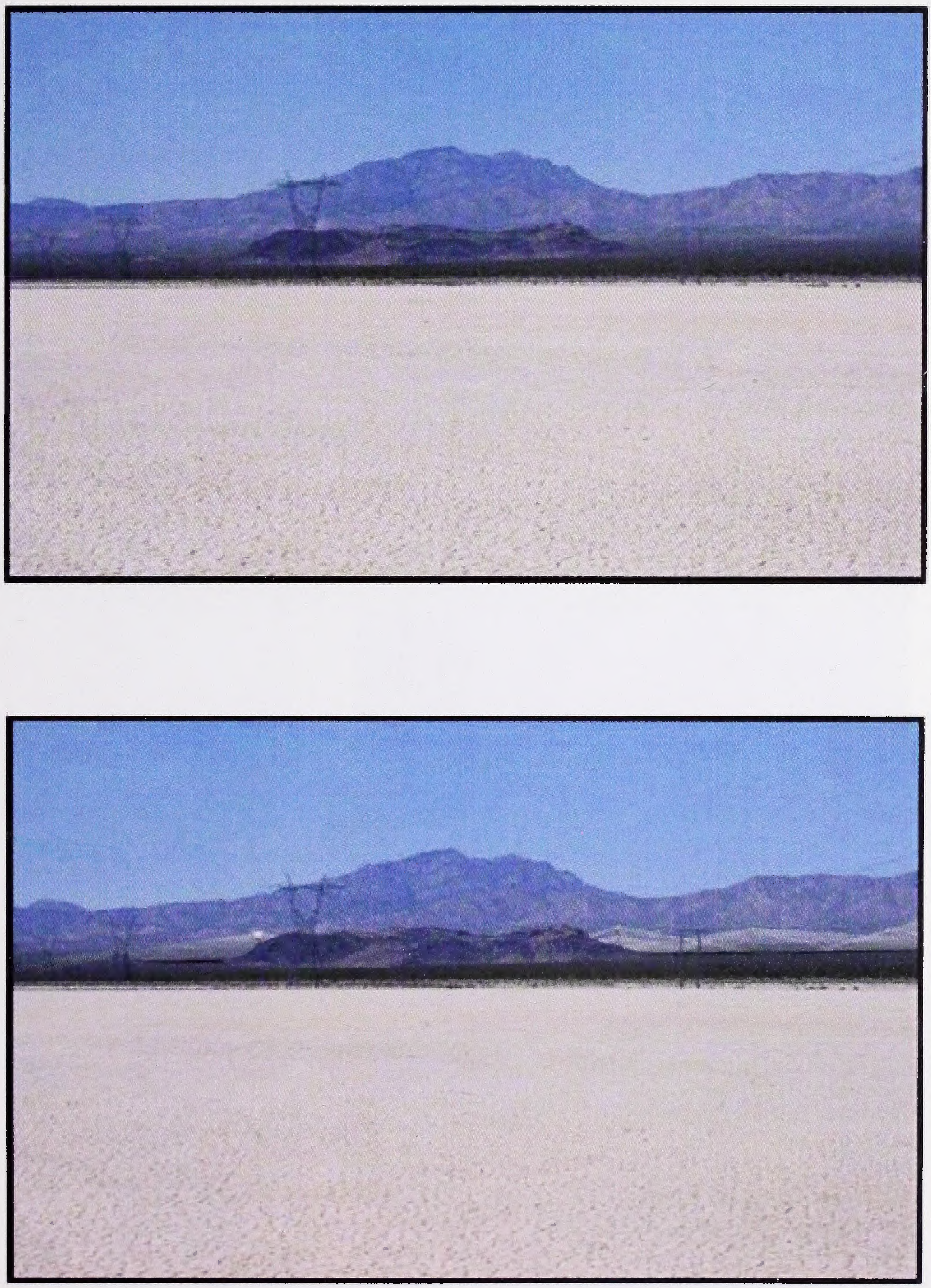
SOURCE: DR SET 2C #148 Figure DR148-3, DR 2C #148 Figure DR 147-4

Figure 4.13-12
Ivanpah Solar Electric Generating System - Ivanpah 2, 3 From East Side of Lake



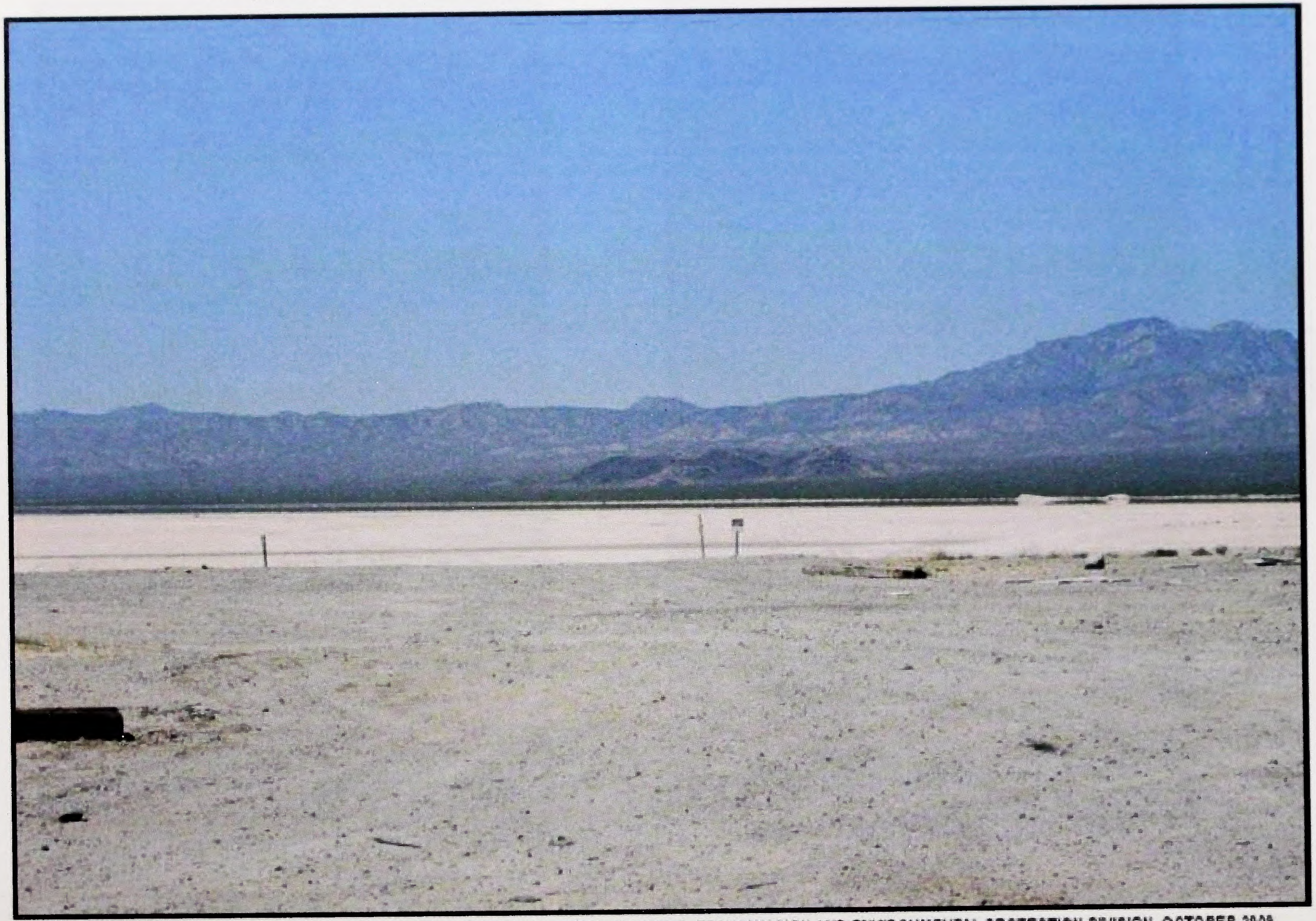
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2008
SOURCE: DR 2C #147 Figure DR 148-4, Figure DR 147-5

Figure 4.13-13
Ivanpah Solar Electric Generating System - Ivanpah 2, 3 From West Side of Lake



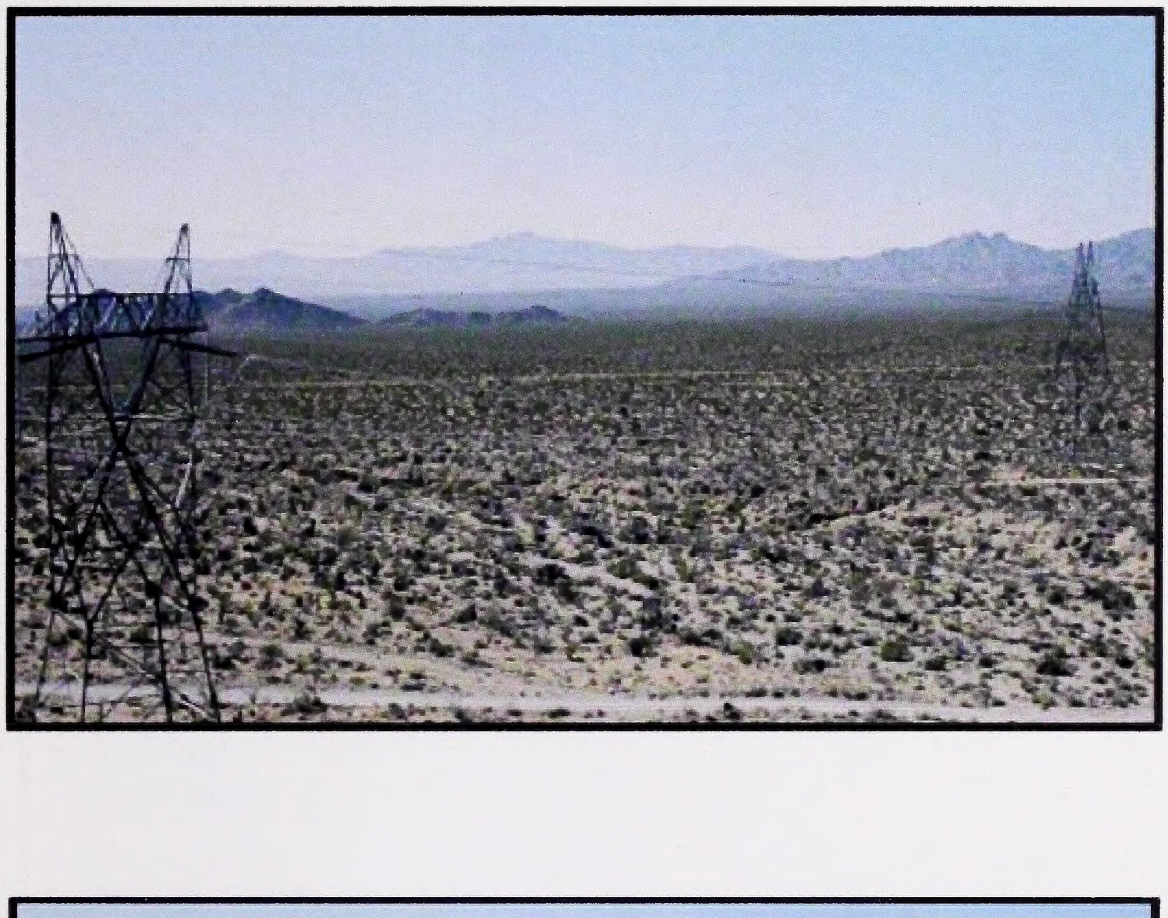
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: DR 2C #147 Figure DR 146-5, Figure DR 147-6

Figure 4.13-14
Ivanpah Solar Electric Generating System - View From Whiskey Pete's



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: DR 2C #148 Figure DR 145-6

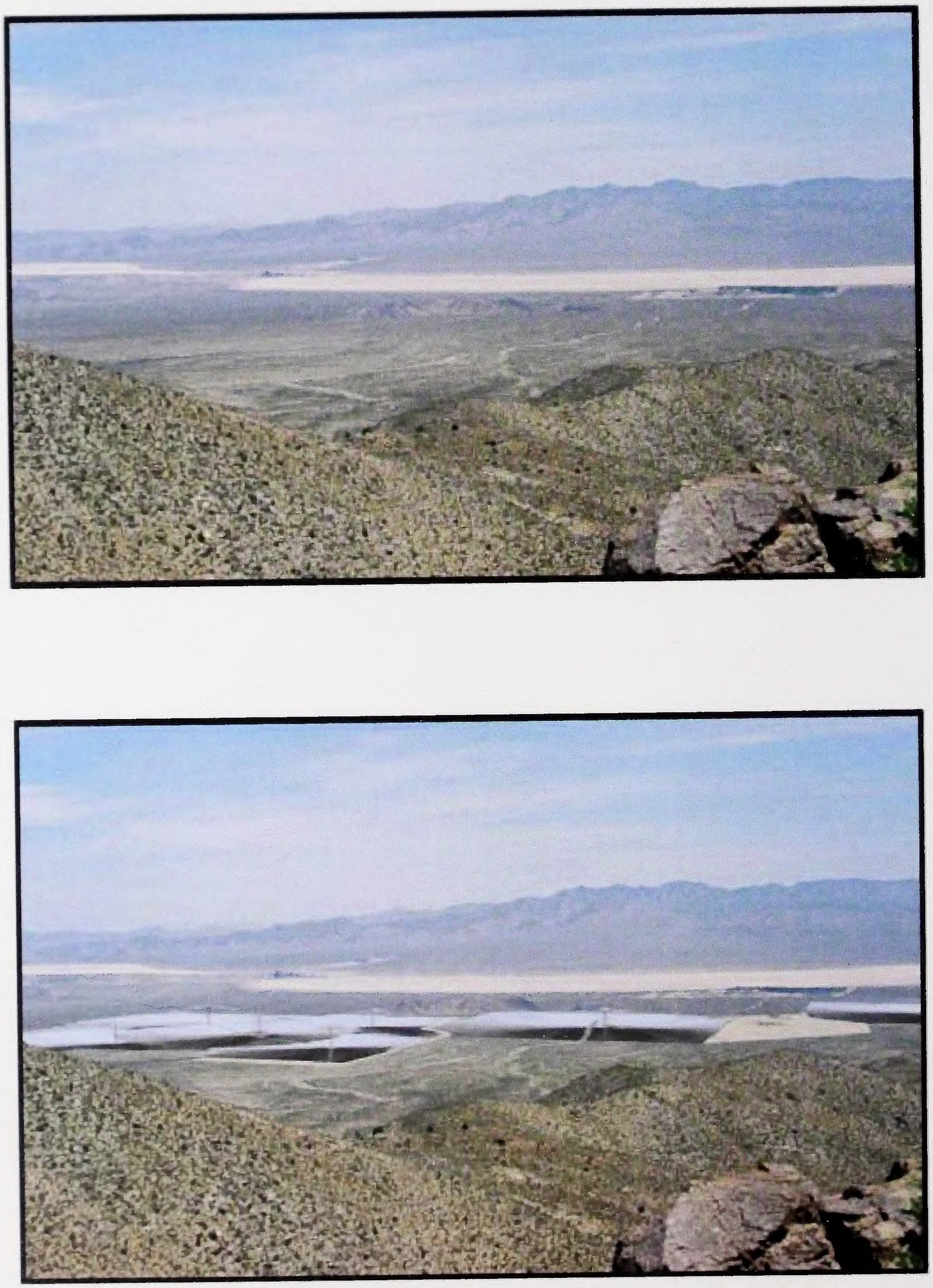
Figure 4.13-15
Ivanpah Solar Electric Generating System - View From Umberci Mine



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2008

SOURCE: DR 2C #148 Figure DR 148-1, Figure DR 147-2

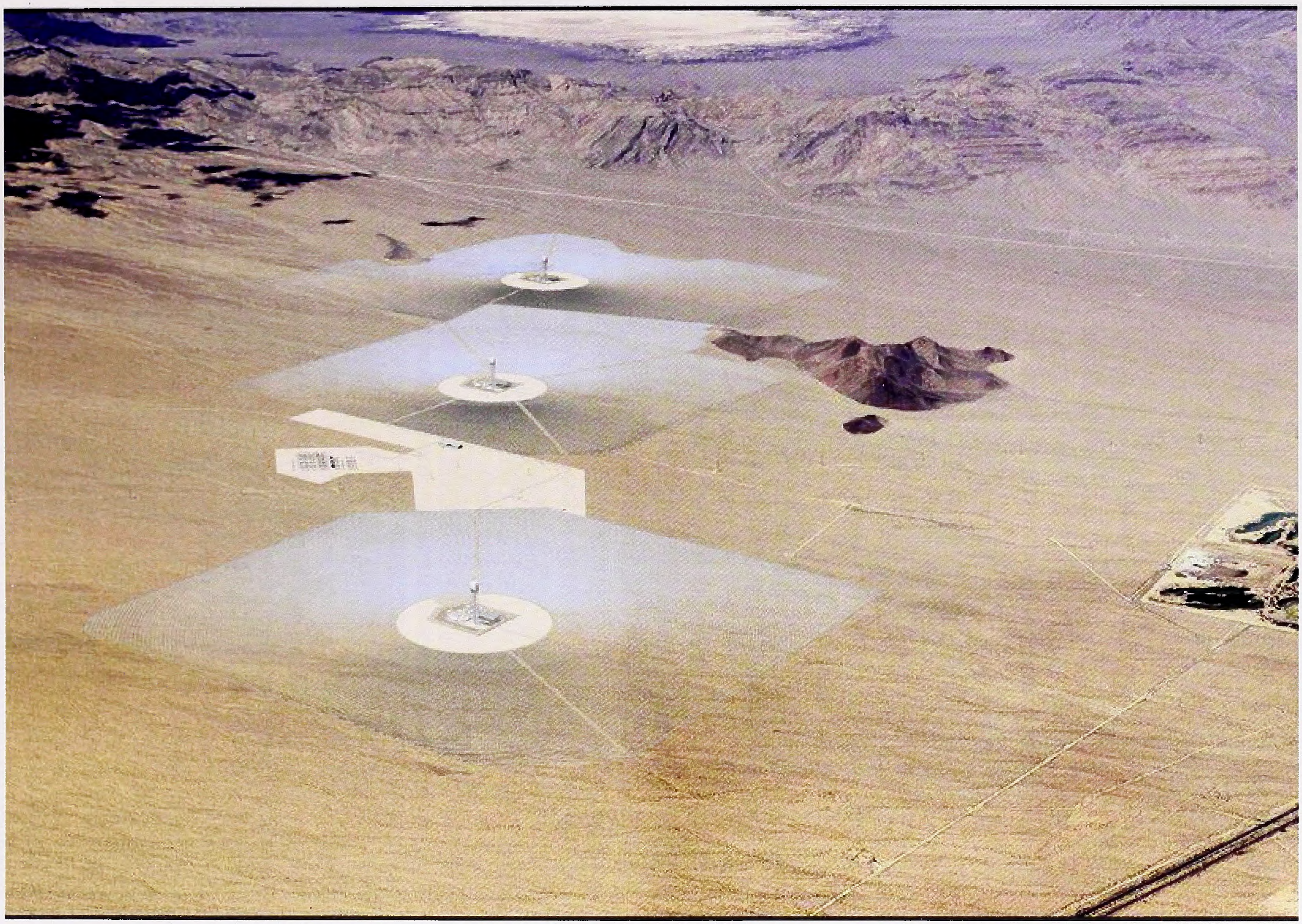
Figure 4.13-16
Ivanpah Solar Electric Generating System - View From Benson Mine/Mojave Preserve



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: DR 2C #148 Figure DR 148-2, Figure DR 147-3

Figure 4.13-17
Artist Rendering of the Mitigated Ivanpah 3 Alternative (Source: BSE 2010a)



4.14 Waste Management

Introduction

This section presents an analysis of issues associated with wastes generated from the proposed construction and operation of the ISEGS. The technical scope of this analysis encompasses solid wastes existing on site and those to be generated during facility construction and operation. Management and discharge of wastewater is addressed in Section 4.10. Additional information related to waste management is also covered in Sections 4.5 and 4.15 of this document.

This analysis is conducted to ensure that:

- the management of project wastes would be in compliance with all applicable laws, regulations, and supplemental authorities. Compliance with laws and regulations ensures that wastes generated during the construction and operation of the proposed project would be managed in an environmentally safe manner.
- the disposal of project wastes would not result in adverse impacts to existing waste disposal facilities.
- upon project completion, the site is managed in such a way that project wastes and waste constituents would not pose an adverse risk to humans or the environment.

Resource-Specific Project Description

The ISEGS site and linear features are located on undeveloped federal land under the jurisdiction of BLM. The project site is bounded on the north, south, and west by undeveloped land. A golf course is located to the immediate east of the ISEGS site. Overhead electrical transmission lines run within the property (BSE 2007b, p. 5-1). Mitigation measures **WASTE-1** and **WASTE-2** would require the applicant to address any previously unrecognized conditions that may be encountered during construction and operation. These measures require that a registered professional geologist or engineer with experience in remedial investigation and feasibility studies be available for consultation during soil excavation and grading activities. This would be adequate to address identification and investigation of any soil or groundwater contamination that may be encountered.

Non-hazardous solid wastes generated during construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste (CH2M Hill 2007, § 5.14.4.1.1). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a Class III solid waste disposal facility. Generation of hazardous wastes anticipated during construction includes over 100 5-gallon empty hazardous material containers which would include 4,300 pounds of solvents, waste paint, and adhesives; 3,000 pounds of oil absorbents, used oil, oily rags; varying amounts of universal wastes; and waste oil filters (CH2M Hill 2007, § 5.14.4.1.1). Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper, and other substances hazardous to human and environmental health. Examples of universal wastes are batteries, fluorescent tubes, and some electronic devices. Hazardous wastes would be recycled to the extent possible and disposed in either a Class I or II waste facility as appropriate.

All operational wastes produced at ISEGS would be properly collected, treated (if necessary), and disposed of at either a Class I or II waste facility as appropriate. Wastes include process and sanitary wastewater, nonhazardous waste and hazardous waste, both liquid and solid. A septic system for sanitary wastewater would be located at the administration building/operations and maintenance area, located between Ivanpah 1 and 2. Portable toilets would be placed in the power block areas of each the three solar facilities and pumped by a sanitary service provider. Process wastewater from all equipment, including the boilers and water treatment equipment would be recycled. If necessary, a small filter/purification system would be used to treat project groundwater and provide potable water at the administration building. Any reject streams from water treatment would be trucked off site for treatment or disposal at either a Class I or II waste facility as appropriate. Additionally, two concrete-lined holding basins, approximately 40 feet by 60 feet by 6 feet deep in size, would be part of each power block facility, and would serve for boiler commissioning and emergency outfalls from any of the processes.

Applicable Laws, Regulations, and Supplemental Authorities

The following federal, state, and local environmental laws, regulations, and supplemental authorities have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment. Project compliance with the various laws and regulations is a major component of the evaluation of the acceptability of the ISEGS with respect to management of waste.

Table 4.14-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law	Description
Federal	
Title 42, United States Code, §§ 6901, et seq. Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)	The Solid Waste Disposal Act, as amended and revised by the RCRA et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation, and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills.

Applicable Law	Description
Title 40, Code of Federal Regulations, Subchapter I – Solid Wastes	These regulations were established by EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes. EPA implements the regulations at the federal level. However, California is an authorized state so the regulations are implemented by state agencies and authorized local agencies in lieu of EPA.
Title 49, CFR, Parts 172 and 173 Hazardous Materials Regulations	DOT established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, Section 262.20.
State	
California Health and Safety Code, Chapter 6.5, §§ 25100, et seq. Hazardous Waste Control Act of 1972, as amended	This California law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The Cal/EPA, DTSC administers and implements the provisions of the law at the state level. CUPAs implement some elements of the law at the local level.
Title 22, California Code of Regulations, Division 4.5 Environmental Health Standards for the Management of Hazardous Waste	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The Title 22 regulations are established and enforced at the state level by DTSC. Some generator standards are also enforced at the local level by CUPAs.
California Health and Safety Code, Chapter 6.11 §§ 25404–25404.9 Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)	The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below. • Aboveground Storage Tank Program • Business Plan Program • California Accidental Release Prevention Program • Hazardous Materials Management Plan / Hazardous Materials Inventory Statement Program • Hazardous Waste Generator / Tiered Permitting Program • Underground Storage Tank Program The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as CUPAs. San Diego County Department of Environmental Health is the area CUPA.

Applicable Law	Description
Title 27, CCR, Division 1, Subdivision 4, Chapter 1, §§ 15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410). • Article 10 – Business Reporting to CUPAs (§§ 15600–15620).
Public Resources Code, Division 30, §§ 40000, et seq. California Integrated Waste Management Act of 1989.	The California Integrated Waste Management Act of 1989 (as amended) establishes mandates and standards for management of solid waste. Among other things, the law includes provisions addressing solid waste source reduction and recycling, standards for design and construction of municipal landfills, and programs for county waste management plans and local implementation of solid waste requirements.
California Health and Safety Code, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq. Hazardous Waste Source Reduction and Management Review Act of 1989 (also known as SB 14).	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (~ 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a 4-year cycle, with a summary progress report due to DTSC every 4th year.
Title 22, CCR, § 67100.1 et seq. Hazardous Waste Source Reduction and Management Review.	These regulations further clarify and implement the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
California Fire Code	Controls storage of hazardous materials and wastes and the use and storage of flammable/combustible liquids. Waste will be accumulated and stored in accordance with Fire Code requirements. Permits for storage containers will be obtained, as needed, from the San Bernardino County Fire Department.
Local	
San Bernardino County, Countywide Integrated Waste Management Plan	This document sets forth the county's goals, policies, and programs for reducing dependence on landfill solid wastes and increasing source reduction, recycling, and reuse of products and waste, in compliance with the CIWMA. The plan also addresses the siting and development of recycling and disposal facilities and programs within the county.

4.14.1 Affected Environment

Existing Project Site Conditions and Potential for Contamination

For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, the significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways for workers, the public, or sensitive species or environmental areas to be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human health or environmental receptors would be considered a direct, adverse impact.

As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment be prepared[28] and submitted as part of an AFC. The Phase I Environmental Site Assessment is conducted to identify any conditions indicative of releases and threatened releases of hazardous substances at the site and to identify any areas known to be contaminated (or a source of contamination) on or near the site.

In general, the Phase I Environmental Site Assessment uses a qualified environmental professional to conduct inquiries into past uses and ownership of the property, research hazardous substance releases and hazardous waste disposal at the site and within a certain distance of the site, and visually inspect the property, making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the environmental professional then provides findings about the environmental conditions at the site. In addition, since the Phase I Environmental Site Assessment does not include sampling or testing, the environmental professional may also give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were significant gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition. If additional investigation is needed to identify the extent of possible contamination, a Phase II Environmental Site Assessment may be required. The Phase II Environmental Site Assessment usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the potential for remediation at the site. In conducting its assessment of a proposed project, BLM will review the project's Phase I Environmental Site Assessment and work with the appropriate oversight agencies as necessary to determine if additional site characterization work is needed and if any mitigation is necessary at the site to ensure protection of human health and the environment from any hazardous substance releases or contamination identified.

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[28] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the agency.

A Phase I Environmental Site Assessment of the proposed project site, dated August 2007, was prepared by CH2M Hill in accordance with the American Society for Testing and Materials Standard Practice E 1527-00 for Environmental Site Assessments. The Phase I Environmental Site Assessment is included as Appendix 5.14A in Volume 2 of the project AFC (BSE 2007b, Appendix 5.14A).

The Phase I Environmental Site Assessment conducted for the proposed ISEGS site did not identify any recognized environmental conditions associated with the proposed project site and linear facility corridors. A recognized environmental condition is the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicated an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or in the ground, groundwater, or surface water of the property.

4.14.2 Environmental Consequences

This waste management analysis addresses: a) existing project site conditions and the potential for contamination associated with prior activities on or near the project site, and b) the impacts from the generation and management of wastes during project construction and operation.

Methodology

Regarding the management of project-related wastes generated during construction, operation, and closure/decommissioning of the proposed project, BLM reviewed the applicant's proposed solid and hazardous waste management methods and determined if the methods proposed are consistent with the laws and regulations identified for waste disposal and recycling. The federal, state, and local laws and regulations represent a comprehensive regulatory system designed to protect human health and the environment from impacts associated with management of both non-hazardous and hazardous wastes. Absent any unusual circumstances, project compliance with laws and regulations would be sufficient to ensure that no direct, adverse impacts would occur as a result of project waste management.

BLM then reviewed the capacity available at off-site treatment and disposal sites and determined whether or not the proposed power plant's waste would impact the available capacity.

4.14.2.1 Proposed Project

Construction Impacts

Site preparation and construction of the proposed power plant and associated facilities would generate both nonhazardous and hazardous wastes in solid and liquid forms (CH2M Hill 2007, § 5.14.4.1). Mitigation measure **WASTE-3** would require a Construction Waste Management Plan to be developed prior to the beginning of construction, to ensure that the waste will be recycled when possible and properly landfilled when necessary.

Non-Hazardous Wastes

Non-hazardous solid wastes generated during construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste (CH2M Hill 2007, § 5.14.4.1.1). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a solid waste disposal facility, in accordance with Title 14, California Code of Regulations, sections 17200 et seq.

Table 5.14-4 of the project AFC identifies three waste disposal facilities that could potentially take the non-hazardous construction and operation wastes generated by the ISEGS: the Sloan Transfer facility in Sloan, Nevada; Apex Regional Landfill in Las Vegas, Nevada; and Barstow Sanitary Landfill in Barstow, California. The remaining capacity for the disposal facilities is over 5 million cubic yards. The total amount of non-hazardous waste generated from the project is estimated to be less than 300 cubic yards of solid waste from construction, and approximately 250 cubic yards per year from operation. This would contribute much less than 1 percent of the available landfill capacity. Therefore, disposal of the solid wastes generated by the ISEGS can occur without adversely impacting the capacity or remaining life of any of these facilities.

Non-hazardous liquid wastes would also be generated during construction, including sanitary wastes, dust suppression, drainage, and equipment wash water. Sanitary wastes would be collected in portable, self-contained toilets and pumped periodically for disposal at an appropriate facility. Potentially contaminated equipment wash water would be contained at designated wash areas and transported to a sanitary wastewater treatment facility. Please see Section 4.10 of this document for more information on the management of project wastewater.

Hazardous Wastes

The generation of hazardous wastes anticipated during construction includes over 100 5-gallon empty hazardous material containers which would include 4,300 pounds of solvents, waste paint, and adhesives; 3,000 pounds of oil absorbents, used oil, oily rags; and varying amounts of batteries, waste oil filters, etc. Table 5.14-2 contains a detailed list of wastes that would be generated during construction. The amount of waste would be minor if handled in the manner identified in the AFC (CH2M Hill 2007, § 5.14.4.1.1).

The project owner would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction, as discussed in mitigation measure **WASTE-4**. This would ensure compliance with California Code of Regulation Title 22, Division 4.5. Although the hazardous waste generator number is determined based on site location, both the construction contractor and the project owner/operator could be considered the generator of hazardous wastes at the site. Wastes would be accumulated on site for less than 90 days and then properly manifested, transported, and disposed at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. According to the disposal methods described in AFC section 5.14.4.1.1, all wastes would be disposed of in accordance with all applicable laws and regulations. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by mitigation measure **WASTE-5** to notify the BLM Authorized Officer and the CPM whenever the owner becomes aware of any such action.

Section 5.14.4.2.2 of the project AFC discusses the two Class I landfills that are open in California: the Clean Harbor Landfill (Buttonwillow) in Kern County and the Chemical Waste Management Landfill (Kettleman Hills) in Kings County. The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is in excess of 11 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with approximately 30 years of remaining operating lifetimes.

Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility. The 4 tons of hazardous waste from the ISEGS requiring off-site disposal is estimated to occupy less than 10 cubic yards. This volume would be much less than the remaining capacity of either Class I waste facility. Therefore, the disposal of hazardous wastes generated by the ISEGS can occur without adversely impacting the capacity or remaining life of these facilities.

In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils and/or specific handling, disposal, and other precautions that may be necessary pursuant to hazardous waste management laws and regulations, mitigation measures **WASTE-1** and **WASTE-2** would address any soil contamination contingency that may be encountered during construction of the project and would ensure compliance with laws and regulations. Absent any unusual circumstances, project compliance with laws and regulations would be sufficient to ensure that no adverse impacts would occur as a result of project waste management activities.

Operations Impacts

The proposed ISEGS would generate non-hazardous and hazardous wastes in both solid and liquid forms under normal operating conditions. Table 5.14-3 of the project AFC gives a summary of the operation waste streams, expected waste volumes and generation frequency, and management methods proposed. Before operations can begin, the project owner would be required to develop and implement an Operation Waste Management Plan, as discussed in mitigation measures **WASTE-6**. This would ensure that an accurate record is maintained of the project's waste storage, generation, and disposal, and compliance with waste regulations is maintained during operation.

Non-Hazardous Solid Wastes

The generation of 240 tons per year of non-hazardous solid wastes expected during project operation include routine maintenance wastes (such as used air filters, spent deionization resins, sand and filter media) as well as domestic and office wastes (such as office paper, newsprint, aluminum cans, plastic, and glass) (CH2M Hill 2007 page 5.14-5). All non-hazardous wastes would be recycled to the extent possible, and non-recyclable wastes would be regularly transported off site to a local solid waste disposal facility (CH2M Hill 2007, § 5.14.4.1.2).

Non-Hazardous Liquid Wastes

Non-hazardous liquid wastes would be generated during facility operation and are discussed in Section 4.10 of this document.

Hazardous Wastes

The project owner/operator would be considered the generator of hazardous wastes at the site during facility operations. The project would generate approximately four tons of hazardous waste. Therefore, the project owner's unique hazardous waste generator identification number, obtained prior to construction in accordance with mitigation measure **WASTE-4**, would be retained and used for hazardous waste generated during facility operation.

The generation of hazardous wastes expected during routine project operation includes used hydraulic fluids, oils, greases, oily filters and rags, cleaning solutions and solvents, and batteries. In addition, spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or materials that may require corrective action and management as hazardous waste. Proper hazardous material handling and good housekeeping practices would help keep spill wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, mitigation measure **WASTE-7** would require the project owner/operator to report, clean up, and remediate as necessary, any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements.

The amount of hazardous wastes generated during the operation of ISEGS would be minor, with source reduction and recycling of wastes implemented whenever possible. The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, CCR, §§ 66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by mitigation measure **WASTE-5** to notify the BLM Authorized Officer and the CPM whenever the owner becomes aware of any such action.

Closure/Decommissioning Impacts

The closure or decommissioning of the ISEGS project would produce both hazardous and non-hazardous solid and liquid waste. The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established by the Energy Commission as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated and closed in compliance with public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission. The facility closure plan documents non-hazardous and hazardous waste management practices including: the inventory, management, and disposal of hazardous materials and wastes, and permanent disposal of permitted hazardous materials and waste storage units.

The handling and management of waste generated by ISEGS would follow the hierarchical approach of source reduction, recycling, treatment, and disposal as specified in California Public Resources Code Sections 40051 and 40196. The first priority of the project owner will be to use materials that reduce the waste that is generated. The next level of waste management will involve reusing or recycling wastes. For wastes that cannot be recycled, treatment will be used, if possible, to make the waste nonhazardous. Finally, waste that cannot be reused, recycled or treated would be transported off site to a permitted treatment, storage, or disposal facility. It is expected that there will be adequate landfill capacity available to dispose of both non-hazardous and hazardous waste from the closure or decommissioning of the proposed project in both California and Nevada. Mitigation measures **WASTE-4** through **-7** would continue to apply to ISEGS during closure or decommissioning of the project.

Beneficial Impacts

BLM has not identified any beneficial impacts associated with Waste Management.

4.14.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

The construction impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with the generation of non-hazardous wastes including construction debris, sanitary wastes, vehicle and equipment maintenance wastes, as well as hazardous wastes from the use of solvents, paints, and adhesives. For the proposed project, these wastes would be managed in accordance with applicable regulations and industry standards, and the proposed project would therefore not result in any adverse impacts. The construction of the Mitigated Ivanpah 3 Alternative would be expected to use the same types and amounts of materials as the proposed project, and would therefore generate the same waste materials. The wastes would be managed and disposed of in the same manner for both alternatives. The primary difference in the construction of the alternatives would be the reduced number of power tower receivers and heliostats for the Mitigated Ivanpah 3 Alternative, which would result in a reduced volume of wastes generated. Therefore, the potential impact of waste management for the Mitigated Ivanpah 3 Alternative would be lower than that of the proposed project.

Operations Impacts

The waste management impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with the generation of waste materials during operations. For the proposed project, the management of wastes would be conducted in compliance with regulatory requirements, as well as mitigation measures, and would therefore not result in any impacts.

The operations of the Mitigated Ivanpah 3 Alternative would be expected to generate the same types and amounts of wastes as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the operations would occur with the same type and amount of equipment and workers as the proposed project. Therefore, there would not be any substantial difference in impacts associated with waste management between the proposed project and the Mitigated Ivanpah 3 Alternative.

Closure/Decommissioning Impacts

The waste management impacts resulting from decommissioning of the Mitigated Ivanpah 3 Alternative would be associated with the demolition of site structures, as well as sanitary and vehicle maintenance wastes, similar to those generated during construction. For the proposed project, the management of waste materials would be conducted in compliance with regulatory requirements, as well as mitigation measures, and would therefore not result in any impacts

The closure and decommissioning of the Mitigated Ivanpah 3 Alternative would be expected to generate the same types of wastes materials as the proposed project. However, due to the reduction in the acreage, number of power tower receivers, and number of heliostats, closure and decommissioning of the Mitigated Ivanpah 3 Alternative would generate a lower volume of waste materials than the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with waste management.

4.14.2.3 Modified I-15 Alternative

Construction Impacts

The construction impacts resulting from the Modified I-15 Alternative would be associated with the generation of non-hazardous wastes including construction debris, sanitary wastes, vehicle and equipment maintenance wastes, as well as hazardous wastes from the use of solvents, paints, and adhesives. For the proposed project, these wastes would be managed in accordance with applicable regulations and industry standards, and the proposed project would therefore not result in any adverse impacts. The construction of the Modified I-15 Alternative would be expected to use the same types and amounts of materials as the proposed project, and would therefore generate the same waste materials. The wastes would be managed and disposed of in the same manner for both alternatives. The primary difference in the construction of the alternatives would be the reduced number of power tower receivers and heliostats for the Modified I-15 Alternative, which would result in a reduced volume of wastes generated. Therefore, the potential impact of waste management for the Modified I-15 Alternative would be lower than that of the proposed project.

Operations Impacts

The waste management impacts resulting from the Modified I-15 Alternative would be associated with the generation of waste materials during operations. For the proposed project, the management of wastes would be conducted in compliance with regulatory requirements, as well as mitigation measures, and would therefore not result in any impacts.

The operations of the Modified I-15 Alternative would be expected to generate the same types and amounts of wastes as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the operations would occur with the same type and amount of equipment and workers as the proposed project. Therefore, there would not be any substantial difference in impacts associated with waste management between the proposed project and the Modified I-15 Alternative.

Closure/Decommissioning Impacts

The waste management impacts resulting from decommissioning of the Modified I-15 Alternative would be associated with the demolition of site structures, as well as sanitary and vehicle maintenance wastes, similar to those generated during construction. For the proposed project, the management of waste materials would be conducted in compliance with regulatory requirements, as well as mitigation measures, and would therefore not result in any impacts.

The closure and decommissioning of the Modified I-15 Alternative would be expected to generate the same types of wastes materials as the proposed project. However, due to the reduction in the acreage, number of power tower receivers, and number of heliostats, closure and decommissioning of the Modified I-15 Alternative would generate a lower volume of waste materials than the proposed project.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with waste management.

4.14.2.4 No Action

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and could be considered for another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

4.14.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

The proposed ISEGS would comply with all applicable laws and regulations regulating the management of hazardous and non-hazardous wastes during both facility construction and operation. The applicant is required to recycle and/or dispose hazardous and non-hazardous wastes at facilities licensed or otherwise approved to accept the wastes. Because hazardous wastes would be produced during both project construction and operation, the ISEGS would be required to obtain a hazardous waste generator identification number from EPA. The ISEGS would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

4.14.4 Mitigation Measures

WASTE-1 The project owner shall provide the resume of an experienced and qualified professional engineer or professional geologist, who shall be available for consultation during site characterization (if needed), demolition, excavation, and grading activities, to BLM's Authorized Officer and the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The professional engineer or professional geologist shall be given authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil and impact public health, safety and the environment.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume to BLM's Authorized Officer and the CPM for review and approval.

WASTE-2 If potentially contaminated soil is identified during site characterization, demolition, excavation, or grading at either the proposed site or linear facilities, as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the professional engineer or professional geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and provide a written report to the project owner, representatives of Department of Toxic Substances Control or Regional Water Quality Control Board, and BLM's Authorized Officer and the CPM stating the recommended course of action.

Depending on the nature and extent of contamination, the professional engineer or professional geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. If, in the opinion of the professional engineer or professional geologist, significant remediation may be required, the project owner shall contact BLM's Authorized Officer and the CPM and representatives of the

Department of Toxic Substances Control for or the Regional Water Quality Control Board, for guidance and possible oversight.

Verification: The project owner shall submit any final reports filed by the professional engineer or professional geologist to BLM's Authorized Officer and the CPM within 5 days of their receipt. The project owner shall notify BLM's Authorized Officer and the CPM within 24 hours of any orders issued to halt construction.

WASTE-3 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to BLM's Authorized Officer and the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications; and
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans.

Verification: The project owner shall submit the Construction Waste Management Plan to BLM's Authorized Officer and the CPM for approval no less than 30 days prior to the initiation of construction activities at the site. BLM's Authorized Officer and the CPM shall approve or identify any material deficiencies in the Construction Waste Management Plan within 30 days following receipt of the Plan.

WASTE-4 The project owner shall obtain a hazardous waste generator identification number from the United States Environmental Protection Agency prior to generating any hazardous waste during project construction and operations.

Verification: The project owner shall keep a copy of the identification number on file at the project site and provide documentation of the hazardous waste generation notification and receipt of the number to BLM's Authorized Officer and the CPM in the next scheduled Monthly Compliance Report after receipt of the number. Submittal of the notification and issued number documentation to BLM's Authorized Officer and the CPM is only needed once unless there is a change in ownership, operation, waste generation, or waste characteristics that requires a new notification to EPA. Documentation of any new or revised hazardous waste generation notifications or changes in identification number shall be provided to BLM's Authorized Officer and the CPM in the next scheduled compliance report.

WASTE-5 Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify BLM's Authorized Officer and the CPM of any such action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify BLM's Authorized Officer and the CPM in writing within 10 days of becoming aware of an impending enforcement action. BLM's Authorized Officer and the CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed.

WASTE-6 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the facility and shall submit the plan to BLM's Authorized Officer and the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- information and summary records of conversations with the local Certified Unified Program Agency and the Department of Toxic Substances Control regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- a detailed description of how facility wastes will be managed and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and
- a detailed description of how facility wastes will be managed and disposed upon closure of the facility.

Verification: The project owner shall submit the Operation Waste Management Plan to BLM's Authorized Officer and the CPM for approval no less than 30 days prior to the start of project operation. BLM's Authorized Officer and the CPM shall approve or identify any material deficiencies in the Operation Waste Management Plan within 30 days following receipt of the Plan. The project owner shall submit any required revisions to BLM's Authorized Officer and the CPM within 20 days of notification from BLM's Authorized Officer and the CPM that revisions are necessary.

The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current waste generation and management practices.

WASTE-7 The project owner shall ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are reported, cleaned up, and remediated as necessary, in accordance with all applicable federal, state, and local requirements.

Verification: The project owner shall document all unauthorized releases and spills of hazardous substances, materials, or wastes that occur on the project property or related pipeline and transmission corridors. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; amount of contaminated soil/material generated; how release was managed and material cleaned up; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements imposed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release. Copies of the unauthorized spill documentation shall be provided to BLM's Authorized Officer and the CPM within 30 days of the date the release was discovered.

4.14.5 Summary

Project wastes would be managed in compliance with all applicable waste management laws and regulations. Both construction and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and nonrecyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Management of the waste generated during construction and operation of the ISEGS would not result in any direct or cumulative adverse impacts, and would comply with applicable laws and regulations, if the waste management practices and mitigation measures are implemented.

Mitigation measures **WASTE-1** through **WASTE-7** would help ensure and facilitate ongoing project compliance with laws and regulations. These measures would require the project owner to do all of the following:

- Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how wastes will be managed, recycled, and/or disposed of after generation (**WASTE-3** and **6**).
- Obtain a hazardous waste generator identification number (**WASTE-4**).
- Ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE-1, 2, and 7**).
- Report any waste management-related laws and regulations enforcement actions and how violations will be corrected (**WASTE-5**).

- Ensure that all spills or releases of hazardous substances are reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-7**).

The existing available capacity for the Class III landfills that may be used to manage nonhazardous project wastes exceeds 1 billion cubic yards. The total amount of nonhazardous wastes generated from construction and operation of ISEGS would contribute less than 0.1 percent of the remaining landfill capacity. Therefore, disposal of project generated non-hazardous wastes would not have an adverse impact on Class III landfill capacity.

In addition, the Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of ISEGS have a remaining capacity in excess of 68 million cubic yards (Campbell 2008). The total amount of hazardous wastes generated by the ISEGS would contribute less than 0.02 percent of the remaining permitted capacity. Therefore, impacts from disposal of ISEGS generated hazardous wastes would not have an adverse impact on the remaining capacity at Class I landfills.

Overall, by following regulatory requirements and mitigation measures, there would be no potential adverse impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any hazards associated with waste generation and management would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration of construction, and reduced volume of materials requiring demolition.

Table 4.14-2
Comparison of Waste Management Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Construction debris	No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	No potential impact
Sanitary wastes	No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	No potential impact
Vehicle and equipment maintenance wastes	No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	No potential impact
Hazardous wastes	No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	No potential impact
Demolition wastes	No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	No potential impact

4.15 Worker Safety and Fire Protection

Introduction

Worker safety and fire protection are regulated through federal, state, and local laws and regulations. Industrial workers at the facility both operate equipment and handle hazardous materials daily, and could face hazards resulting in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or minimize their risk through special training, protective equipment, and procedural controls.

The purpose of this section is to assess the worker safety and fire protection measures proposed by the ISEGS applicant and determine whether the applicant has proposed adequate measures to:

- Comply with applicable safety laws and regulations;
- Protect workers during the construction and operation of the facility;
- Protect against fire; and
- Provide adequate emergency response procedures.

Resource-Specific Project Description

Industrial environments are potentially dangerous during both construction and operation. Workers at the proposed project will be exposed to loud noises, moving equipment, trenches, and confined space entry and egress. Workers may sustain falls, trips, burns, lacerations, and other injuries. They may be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks or electrocution. It is important that ISEGS has well-defined policies and procedures, training, and hazard recognition and control to minimize these hazards and protect workers. If the facility complies with all laws and regulations, workers will be adequately protected from health and safety hazards.

During construction and operation of the proposed ISEGS there is the potential for small fires, major structural fires and wild fires. Electrical sparks, combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, insulating fluid at the project power plant switchyard or flammable liquids, explosions, and overheated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare. Compliance with all laws and regulations will be adequate to ensure protection from all fire hazards associated with the project. Wild fires that would use local vegetation as its fuel and could have potential effects on workers and project facilities are not expected to be caused by the project. If wild fires are external to the ISEGS project boundaries, they would not be the responsibility of the project owner to suppress. The applicant has proposed a number of wild fire protective measures that would help reduce the potential for harm to plant personnel and damage to facilities as discussed below under Operations. However, the applicant plans to remove all vegetation in the vicinity of the solar power towers, power blocks, substation and administration areas, and to cut and maintain vegetation in the solar fields to about 12 – 18 inches high. The access road along the perimeter fence lines will also serve as a fire break.

In the evaluation of the proposed project in the DEIS, BLM reviewed the information provided in the AFC and spoke to a representative of the SBCFD to determine if available fire protection services and equipment would adequately protect workers, and to further determine the project's impact on fire protection services in the area. The DEIS concluded that the project would rely on both onsite fire protection systems and local fire protection services. The onsite fire protection system would provide the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the SBCFD. Clark County (Nevada) Fire Department would be called upon if needed, and as available, through a Mutual Aid Agreement with SBCFD (CH2M Hill 2007, section 5.16.4.6) (Crawford 2008).

A Safety and Health Program would be prepared by the applicant to minimize worker hazards during construction and operation of the project. The Safety and Health Program would specify measures that would be taken to ensure compliance with the applicable laws and regulations during the construction and operation of the project.

Safety and Health Program Elements

The applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. The major items required in both Safety and Health Programs are as follows:

Injury and Illness Prevention Program (IIPP)

- The IIPP will include the following components (CH2M Hill 2007, section 5.16.4.4):
- Identify persons with the authority and responsibility for implementing the program;
- Establish the safety and health policy of the plan;
- Define work rules and safe work practices for construction activities;
- Establish a system for ensuring that employees comply with safe and healthy work practices;
- Establish a system to facilitate employer-employee communication;
- Develop procedures for identifying and evaluating workplace hazards and establish necessary program(s);
- Establish methods for correcting unhealthy/unsafe conditions in a timely manner;
- Determine and establish training and instruction requirements and programs;
- Specify safety procedures; and

- Provide training and instruction.

Fire Prevention Plan

The California Code of Regulations requires an operations fire prevention plan (8 CCR § 3221). The AFC outlines a proposed fire prevention plan that will include the following:

- Determine general program requirements;
- Determine fire hazard inventory, including ignition sources and mitigation;
- Develop good housekeeping practices and proper materials storage;
- Establish employee alarms and/or communication system(s);
- Provide portable fire extinguishers at appropriate site locations;
- Locate fixed fire fighting equipment in suitable areas;
- Specify fire control requirements and procedures;
- Establish proper flammable and combustible liquid storage facilities;
- Identify the location and use of flammable and combustible liquids;
- Provide proper dispensing and determine disposal requirements for flammable liquids;
- Establish and determine training and instruction requirements and programs; and
- Identify contacts for information on plan contents.

The applicant would submit the final fire prevention plan to the BLM Authorized Officer and the CPM for review and approval and to the SBCFD for review and comment to satisfy proposed mitigation measures **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Written Safety Program

In addition to the specific plans listed above, additional laws and regulations called "safe work practices" apply to the project. Both the construction and operations safety programs will address safe work practices in a variety of programs. In addition, the project owner would be required to provide personnel protective equipment and exposure monitoring for workers involved in activities where contaminated soil and/or contaminated groundwater exist, per mitigation measures **WORKER SAFETY-1** and **-2**.

Applicable Laws, Regulations, and Supplemental Authorities

Table 4.15-1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
29 U.S. Code sections 651 et seq (Occupational Safety and Health Act of 1970)	This Act mandates safety requirements in the workplace, with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 USC § 651).
29 CFR sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
29 CFR sections 1952.170 to 1952.175	These sections provide federal approval of California's plan for enforcement of its own safety and health requirements, in lieu of most of the federal requirements found in 29 CFR §1910.1 to 1910.1500.
State	
8 CCR all applicable sections (Cal/OSHA regulations)	Requires that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during the construction, commissioning, and operation of power plants, as well as safety around electrical components, fire safety, and hazardous materials usage, storage, and handling.
24 CCR section 3, et seq.	Incorporates the current edition of the International Building Code.
Health and Safety Code sections 25500 to 25541	Requires a Hazardous Materials Business plan detailing emergency response plans for hazardous materials emergencies at a facility.
Local (or locally enforced)	
	San Bernardino County does not have additional laws and regulations that apply to Hazardous Materials Handling, but administers the State of California programs as the CUPA.
2007 Edition of California Fire Code and all applicable NFPA standards (24 CCR Part 9)	NFPA standards are incorporated into the California State Fire Code. The fire code contains general provisions for fire safety, including road and building access, water supplies, fire protection and life safety systems, fire-resistive construction, storage of combustible materials, exits and emergency escapes, and fire alarm systems.
Title 24, California Code of Regulations (24 CCR § 3, et seq.)	The California Building Code is comprised of 11 parts containing building design and construction requirements as they relate to fire, life, and structural safety. It incorporates current editions of the International Building Code, including the electrical, mechanical, energy, and fire codes applicable to the project.

4.15.1 Affected Environment

Fire support services to the site would be under the jurisdiction of the SBCFD. Station 53 is 40 miles from the project site, located at 65 Kingston Circle, Baker, California, and would be the first responder to ISEGS, with a response time of approximately 45 minutes. San Bernardino County Fire Department also has a Mutual Aid Agreement with Clark County (Nevada) Fire Department for responses requiring more assistance, but this assistance is voluntary.

In San Bernardino County, hazardous materials permits and spills are handled and investigated by SBCFD. Because of the highly remote and rural area of ISEGS, services are limited and spread out. San Bernardino County Firefighters receive specialized training to address emergency responses to industrial hazards. The response time to the project site, with full resources capabilities including for large-scale hazardous materials spills, would be 3 to 4 hours. Hazardous materials service is provided out of the SBCFD station in the town of Fontana, Station #78.

4.15.2 Environmental Consequences

Methodology

Two issues are assessed in this section:

1. The potential for impacts on the safety of workers during demolition, construction, operations, and closure and decommissioning activities; and
2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, operations, and closure and decommissioning activities.

Worker safety is essentially a law and regulation compliance matter and if all laws and regulations are followed, workers will be adequately protected. Thus, the standard for the determination of adverse impacts on worker health is whether the applicant has demonstrated adequate knowledge of and commitment to implementation of all pertinent and relevant standards.

The proposed on-site fire-fighting systems proposed by the applicant, and the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the ISEGS site, are evaluated in this section. The evaluation inlcudes review of local fire department capabilities and response times, and interviews with local fire officials to determine if they feel they are adequately staffed, and equipped to respond to the needs of a power plant. This information has been evaluated to determine if the presence of the power plant would cause an adverse impact on a local fire department.

4.15.2.1 Proposed Project

Construction Impacts

Construction Safety and Health Program

ISEGS includes the construction and operation of a hybrid, combined-cycle, natural gas-fired power plant and solar thermal generating equipment. For the Power Block, workers will be exposed to hazards typical of construction and operation of a gas-fired simple-cycle facility, while the solar component will present similar construction risks and minimal operational risks to workers.

Construction safety orders are published at Title 8 of the California Code of Regulations, section 1502 et seq. These requirements are promulgated by Cal/OSHA and apply to the construction phase of the project. The construction safety and health program will include the following:

- Construction injury and illness prevention program (8 CCR § 1509);
- Construction fire prevention plan (8 CCR § 1920);
- Personal protective equipment program (8 CCR §§ 1514 - 1522); and
- Emergency action program and plan.

Additional programs under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) would include:

- Electrical safety program;
- Motor vehicle and heavy equipment safety program;
- Forklift operation program;
- Excavation/trenching program;
- Fall protection program;
- Scaffolding/ladder safety program;
- Articulating boom platforms program;
- Crane and material handling program;
- Housekeeping and material handling and storage program;
- Respiratory protection program;
- Employee exposure monitoring program;
- Hand and portable power tool safety program;
- Hearing conservation program;
- Back injury prevention program;
- Hazard communication program;

- Heat and cold stress monitoring and control program;
- Pressure vessel and pipeline safety program;
- Hazardous waste program;
- Hot work safety program;
- Permit-required confined space entry program; and
- Demolition procedure (if applicable).

The AFC includes adequate outlines for each of the above programs (CH2M Hill 2007, section 5.16.4.4.1). Prior to the project's start of construction, detailed programs and plans would be provided pursuant to mitigation measure **WORKER SAFETY-1**.

During construction, portable fire extinguishers will be located and maintained throughout the site; safety procedures and training will also be implemented (CH2M Hill 2007, section 5.16.4.4.1). Station #53 of the SBCFD in Baker, California, would provide fire protection backup for larger fires that cannot be extinguished using the project's portable suppression equipment (CH2M Hill 2007, section 5.16.4.6).

County Response Services

As discussed above in the Resource-Specific Project Description, information obtained by BLM from the SBCFD during the DEIS process indicated that the proposed project would not cause an adverse impact to County fire, hazardous materials, and emergency response services. In public comments on the DEIS, the SBCFD disagreed with the DEIS conclusion that the project would have no adverse impact on these services, and stated that the County would provide their own evaluation of the financial implications of this impact. In an attempt to rectify the contradictory information provided by the SBCFD, BLM submitted a letter to the County requesting additional information on the specific impacts, and the County's financial estimate. However, as of the time of publication of this FEIS, the requested information has not been received. Although such impacts to County services may occur, neither BLM nor the County has a legal mechanism in place to require the applicant to provide funding to the County to address this impact.

Operations Impacts

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be stored in the 250,000 gallon raw water storage tank to be located in each power block. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. An electric jockey pump and electric motor-driven main fire pump would be provided to increase the water pressure to the level required to serve all fire fighting systems. In addition, a backup diesel engine-driven fire pump would be provided to pressurize the fire loop if the power supply to the electric motor-driven main fire pump fails. All fire protection systems would be focused on the power blocks, administration/warehouse building, and other areas of active operations. The applicant has proposed a number of wild fire protective measures that would help reduce the potential for harm to plant personnel and damage to facilities. These include removal of all vegetation in the vicinity of the solar power towers, power blocks, substation and administration areas, and cutting and maintaining vegetation in the solar fields to about 12 – 18 inches high. The access road along the perimeter fence lines would also serve as a fire break.

In addition to the fixed fire protection system, smoke detectors, flame detectors, high-temperature detectors, appropriate class of service portable extinguishers, and fire hydrants must be located throughout the facility at code-approved intervals. These systems are standard requirements of the fire code and NFPA standards.

The applicant would be required by mitigation measures **WORKER SAFETY-1** and **-2** to provide a final fire protection and prevention program to both BLM and the SBCFD prior to the construction and operation of the project in order to confirm the adequacy of proposed fire protection measures.

Operations and Maintenance Safety and Health Program

Prior to the start-up of ISEGS, an operations and maintenance safety and health program will be prepared. This program will include the following programs and plans:

- Injury and illness prevention program (8 CCR § 3203);
- Fire prevention program (8 CCR § 3221);
- Personal protective equipment program (8 CCR §§ 3401 to 3411); and
- Emergency action plan (8 CCR § 3220).

In addition, the requirements under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) would apply to this project. Written safety programs for ISEGS, which the applicant would develop, would ensure compliance with those requirements.

The AFC includes adequate outlines for an injury and illness prevention program, an emergency action plan, a fire prevention program, and a personal protective equipment program (CH2M Hill 2007, section 5.16.4.4.2). Prior to operation of ISEGS, all detailed programs and plans would be provided pursuant to mitigation measure **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require personal protective equipment (PPE) and first aid supplies whenever hazards in the environment, or from chemicals or mechanical irritants, could cause injury or impair bodily function through absorption, inhalation, or physical contact (8 CCR sections 3380 to 3400). The ISEGS operational environment would require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or ANSI standards and will carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information about protective clothing and equipment:

- Proper use, maintenance, and storage;

- When protective clothing and equipment are used;
- Benefits and limitations; and
- When and how protective clothing and equipment are replaced.

The PPE program ensures that employers comply with applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential hazards in the workplace, and would be required as per mitigation measures **WORKER SAFETY-1 and -2**.

Emergency Action Plan

California regulations require an emergency action plan (8 CCR § 3220). The AFC contains a satisfactory outline for an emergency action plan (CH2M Hill 2007, section 5.16.4.4).

The outline lists the following features:

- Establishes emergency procedures for the protection of personnel, equipment, the environment, and materials;
- Identifies fire and emergency reporting procedures;
- Determines response actions for accidents involving personnel and/or property;
- Develops response and reporting requirements for bomb threats;
- Specifies site assembly and emergency evacuation route procedures;
- Defines natural disaster responses (for example, earthquakes, high winds, and flooding);
- Establishes reporting and notification procedures for emergencies (including on-site, off-site, local authorities, and/or state jurisdictions);
- Determines alarm and communication systems needed for specific operations;
- Includes a SPCC plan;
- Identifies emergency personnel (response team) responsibilities and notification roster;
- Specifies emergency response equipment and strategic locations; and
- Establishes and determines training and instruction requirements and programs.

An emergency action plan would be required as per mitigation measures **WORKER SAFETY-1 and -2**

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the California Fire Code, all applicable recommended NFPA standards (including Standard 850, which addresses fire protection at electric generating plants), and all Cal-OSHA requirements. Fire suppression elements in the proposed plant would include both fixed and portable fire extinguishing systems.

Emergency Medical Services Response

A statewide survey was conducted by the California Energy Commission to determine the frequency of incidents requiring emergency medical services (EMS) and off-site fire-fighters for natural gas-fired power plants in California. The purpose of this analysis was to determine what impact, if any, power plants might have on local emergency services. The Energy Commission concluded that incidents at power plants requiring fire or EMS responses are infrequent and represent an insignificant impact on local fire departments. However, the Energy Commission determined that the potential for both work-related and non-work related heart attacks exists at power plants. In fact, the Energy Commission's research on the frequency of EMS response to gas-fired power plants shows that many of the responses for cardiac emergencies involved non-work related incidences, including visitors. The need for prompt response within a few minutes is well documented in the medical literature. The Energy Commission believes that the quickest medical intervention can only be achieved with the use of an on-site defibrillator often called an Automatic External Defibrillator (AED); the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations including airports, factories, and government buildings, all of which maintain on-site cardiac defibrillation devices. Therefore, with the availability of modern cost-effective AED devices, it is proper in a power plant environment to maintain these devices on-site in order to treat cardiac arrhythmias resulting from industrial accidents or other non-work related causes. Mitigation measure **WORKER SAFETY-5** would require that a portable AED be located on site, and workers trained in its use.

County Response Services

Similar to the evaluation of construction impacts, BLM currently has contradictory information regarding the impact of proposed project operations on County response services. Again, although such impacts to County services may occur, there is no mechanism for requiring the applicant to provide funding to the County to address this impact.

Closure/Decommissioning Impacts

Upon final facility closure, no workers would remain at the site, except for those necessary to maintain security over any remaining hazardous materials until they are removed from the site. During decommissioning, worker safety would be ensured by the same federal, state and other regulations requiring safety plans and training as were needed for construction and operations. A decommissioning Illness and Injury Prevention Plan would be included as part of the decommissioning plan.

Facility fire protection systems would remain functional while hazardous materials remain on site, and as long as feasible into the decommissioning process.

Beneficial Impacts

There would be no beneficial impacts associated with the proposed project's potential use of fire and emergency service capabilities of the SBCFD.

4.15.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

Potential worker safety hazards associated with construction of the Mitigated Ivanpah 3 Alternative would be similar to those in any industrial setting, and could include exposure to noise; impacts from moving equipment; falls, trips, and lacerations; exposure to hazardous chemicals; burns from fires or hot equipment; and electrical hazards. For the proposed project, these hazards would be addressed and minimized through compliance with Title 8 of the California Code of Regulations, as well as a project-specific Construction Safety and Health Program. The construction of the Mitigated Ivanpah 3 Alternative would be expected to expose workers to the same types of hazards, and would be performed under the same regulations and standards as those described for the proposed project. Because the magnitude of the infrastructure constructed in the Mitigated Ivanpah 3 Alternative, and the duration of construction, would be reduced from that of the proposed project, construction-related hazards to site workers would be reduced as well. Therefore, the potential impact of construction-related worker safety and health hazards for the Mitigated Ivanpah 3 Alternative would be lower than that of the proposed project.

Fire hazards and potential impacts to local fire and emergency response resources associated with construction of the Mitigated Ivanpah 3 Alternative would also be reduced from those for the proposed project. Fire hazards present during construction could potentially occur as a result of handling or management of fuels for vehicles and equipment. The use and handling of fuels for vehicles and equipment would be approximately the same, or slightly lower, for the Mitigated Ivanpah Alternative due to the reduced footprint of the facility, and the reduced duration of construction. These activities would not be expected to have an adverse impact on local fire protection and response resources.

Operations Impacts

Worker safety and fire hazards associated operation of the Mitigated Ivanpah 3 Alternative would be similar to those described for construction, but would be of a much smaller magnitude. Operations would include far fewer workers than construction, and the use of heavy equipment and maintenance vehicles would be greatly reduced. Similar to construction, operations would occur in compliance with regulations in Title 8 of the California Code of Regulations, as well as project-specific operational safety and health plans. Although the magnitude of the Mitigated Ivanpah 3 Alternative would be slightly reduced from that of the proposed project, the number of workers and the nature of their work activities would be approximately the same. Therefore, there would not be any substantial difference in impacts associated with worker safety and fire hazards between the proposed project and the Mitigated Ivanpah 3 Alternative.

The potential impact of wildfires on the operational facility for the proposed project was also evaluated. Vegetation in critical areas, including the power blocks, substation, and administrative areas, would be removed, and would therefore not be subject to wildfires. Vegetation would remain in heliostat fields, but would be maintained at a level of 12 to 18 inches high. Therefore, the vegetation in the heliostat fields would also not present a fire hazard. These vegetation management procedures would be also be applied as a part of the Mitigated Ivanpah 3 Alternative. Therefore, the potential for fire hazard damage would be the same for both alternatives.

Closure/Decommissioning Impacts

The worker safety and fire hazard impacts resulting from decommissioning of the Mitigated Ivanpah 3 Alternative would be similar to those described for construction. For the proposed project, decommissioning activities would be conducted in compliance with regulatory requirements, as well as mitigation measures, and would therefore not result in any impacts. Decommissioning of the Mitigated Ivanpah 3 Alternative would involve the same procedures, but on a slightly reduced scale due to the lower number of power tower receivers and heliostats. Therefore, any worker safety hazards associated with decommissioning would be lower for the Mitigated Ivanpah 3 Alternative than the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with worker safety and fire protection.

4.15.2.3 Modified I-15 Alternative

Construction Impacts

Potential worker safety hazards associated with construction of the Modified I-15 Alternative would be similar to those in any industrial setting, and could include exposure to noise; impacts from moving equipment; falls, trips, and lacerations; exposure to hazardous chemicals; burns from fires or hot equipment; and electrical hazards. For the proposed project, these hazards would be addressed and minimized through compliance with Title 8 of the California Code of Regulations, as well as a project-specific Construction Safety and Health Program. The construction of the Modified I-15 Alternative would be expected to expose workers to the same types of hazards, and would be performed under the same regulations and standards as those described for the proposed project. Because the magnitude of the infrastructure constructed in the Modified I-15 Alternative, and the duration of construction, would be reduced from that of the proposed project, construction-related hazards to site workers would be reduced as well. Therefore, the potential impact of construction-related worker safety and health hazards for the Modified I-15 Alternative would be lower than that of the proposed project.

Fire hazards, and potential impacts to local fire and emergency response resources, associated with construction of the Modified I-15 Alternative would also be reduced from those for the proposed project. Fire hazards present during construction could potentially occur as a result of handling or management of fuels for vehicles and equipment. The use and handling of fuels for vehicles and equipment would be approximately the same, or slightly lower, for the Modified I-15 Alternative due to the reduced footprint of the facility, and the reduced duration of construction. These activities would not be expected to have an adverse impact on local fire protection and response resources.

Operations Impacts

Worker safety and fire hazards associated operation of the Modified I-15 Alternative would be similar to those described for construction, but would be of a smaller magnitude. Operations would include far fewer workers than construction, and the use of heavy equipment and maintenance vehicles would be greatly reduced. Similar to construction, operations would occur in compliance with regulations in Title 8 of the California Code of Regulations, as well as project-specific operational safety and health plans. Although the magnitude of the Modified I-15 Alternative would be slightly reduced from that of the proposed project, the number of workers and the nature of their work activities would be approximately the same. Therefore, there would not be any substantial difference in impacts associated with worker safety and fire hazards between the proposed project and the Modified I-15 Alternative.

The potential impact of wildfires on the operational facility for the proposed project was also evaluated. Vegetation in critical areas, including the power blocks, substation, and administrative areas, would be removed, and would therefore not be subject to wildfires. Vegetation would remain in heliostat fields, but would be maintained at a level of 12 to 18 inches high. Therefore, the vegetation in the heliostat fields would also not present a fire hazard. These vegetation management procedures would be also be applied as a part of the Modified I-15 Alternative. Therefore, the potential for fire hazard damage would be the same for both alternatives.

Closure/Decommissioning Impacts

The worker safety and fire hazard impacts resulting from decommissioning of the Modified I-15 Alternative would be similar to those described for construction. For the proposed project, decommissioning activities would be conducted in compliance with regulatory requirements, as well as mitigation measures, and would therefore not result in any impacts. Decommissioning of the Modified I-15 Alternative would involve the same procedures, but on a slightly reduced scale due to the lower number of power tower receivers and heliostats. Therefore, any worker safety hazards associated with decommissioning would be lower for the Modified I-15 Alternative than the proposed project.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with worker safety and fire protection.

4.15.2.4 No Action

The proposed project would not have adverse impacts on local fire protection services; it would not cause an adverse impact on the public. Thus, the No Action alternative would not avoid or lessen an adverse impact compared to the proposed project.

If the applicant for the proposed ISEGS project provides project construction safety and health and project operations and maintenance safety and health programs, as required by the **WORKER SAFETY** mitigation measures, ISEGS would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable laws and regulations.

4.15.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

Based on a review of the applicant's Construction and Operations Safety and Health programs, these programs have been developed to ensure compliance with Federal, State, and local regulations associated with worker health and safety.

4.15.4 Mitigation Measures

WORKER SAFETY-1 The project owner shall submit to BLM's Authorized Officer and the CPM a copy of the Project Construction Safety and Health Program containing the following:

- A Construction Personal Protective Equipment Program;
- A Construction Exposure Monitoring Program;
- A Construction Injury and Illness Prevention Program;
- A Construction Emergency Action Plan; and
- A Construction Fire Prevention Plan.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval a copy of the Project Construction Safety and Health Program. The project owner shall provide a copy of a letter to the BLM's Authorized Officer and the CPM from the San Bernardino County Fire Department, if any is received, stating the Fire Department's comments on the Construction Fire Prevention Plan and Emergency Action Plan.

The Personal Protective Equipment Program, the Exposure Monitoring Program, and the Injury and Illness Prevention Program shall be submitted to BLM's Authorized Officer and the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the San Bernardino County Fire Department for review and comment prior to submittal to the BLM's Authorized Officer and the CPM for approval.

WORKER SAFETY-2 The project owner shall submit to BLM's Authorized Officer and the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- An Operation Injury and Illness Prevention Plan;
- An Emergency Action Plan;
- Hazardous Materials Management Program;

- Fire Prevention Program (8 CCR § 3221); and;
- Personal Protective Equipment Program (8 CCR §§ 3401-3411).

Verification: At least thirty (30) days prior to the start of first-fire or commissioning, the project owner shall submit to BLM's Authorized Officer and the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program. The project owner shall provide a copy of a letter to BLM's Authorized Officer and the CPM from the San Bernardino County Fire Department stating the Fire Department's comments on the Operations Fire Prevention Plan and Emergency Action Plan.

The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to BLM's Authorized Officer and the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Operation Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the San Bernardino County Fire Department for review and comment.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards, is capable of identifying workplace hazards relating to the construction activities, and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- Have over-all authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- Assure that the safety program for the project complies with Cal/OSHA and federal regulations related to power plant projects;
- Assure that all construction and commissioning workers and supervisors receive adequate safety training;
- Complete accident and safety-related incident investigations, emergency response reports for injuries, and inform BLM's Authorized Officer and the CPM of safety-related incidents; and
- Assure that all the plans identified in **WORKER SAFETY-1 and -2** are implemented.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to BLM's Authorized Officer and the CPM the name and contact information for the CSS. The contact information of any replacement (CSS) shall be submitted to BLM's Authorized Officer and the CPM within three business days.

The CSS shall submit in the Monthly Compliance Report a monthly safety inspection report to include:

- Record of all employees trained for that month (all records shall be kept on site for the duration of the project);

- Summary report of safety management actions and safety-related incidents that occurred during the month;
- Report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- Report of accidents and injuries that occurred during the month.

WORKER SAFETY-4 The project owner shall make payments to the CBO for the services of a Safety Monitor based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. Those services shall be in addition to other work performed by the CBO. The Safety Monitor shall be selected by and report directly to the CBO, and will be responsible for verifying that the Construction Safety Supervisor, as required in **WORKER SAFETY-3**, implements all applicable Cal/OSHA and Commission safety requirements. The Safety Monitor shall conduct on-site (including linear facilities) safety inspections at intervals necessary to fulfill those responsibilities.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall provide proof of its agreement to fund the Safety Monitor services to BLM's Authorized Officer and the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable AED is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on-site whenever the workers that they supervise are on-site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to BLM's Authorized Officer and the CPM for review and approval.

Verification: At least thirty (30) days prior to the start of site mobilization the project owner shall submit to BLM's Authorized Officer and the CPM proof that a portable AED exists on site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall prepare and implement BMPs for the storage and application of herbicides used to control weeds beneath and around the solar array. These plans shall be submitted to BLM's Authorized Officer and the CPM for review and approval.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval a copy of the BMPs for the storage and application of herbicides.

Safety Training Programs

Employees will be trained in the safe work practices described in the above-referenced safety programs.

Additional Safety Issues

This solar power plant will present a unique work environment that includes a solar field located in the high desert. The area under the solar arrays must be kept free from weeds and thus herbicides will be applied as necessary. Exposure to workers via inhalation and ingestion of dusts containing herbicides poses a health risk. Finally, workers will regularly inspect the solar array for broken or non-functioning mirrors by driving up and down dirt paths between the rows of mirrors and even under the mirrors. Cleaning and servicing the mirrors will also be conducted on a routine schedule. All these activities will take place year-round and especially during the summer months of peak solar power generation, when outside ambient temperatures routinely reach 115 °F and above.

The applicant has indicated that workers would be adequately trained and protected, but has not included precautions against exposure to herbicides. Therefore, to ensure that workers are indeed protected, mitigation measure **WORKER SAFETY-6** would include the following provisions:

- The development and implementation of BMPs for the storage and application of herbicides used to control weeds beneath and around the solar array.

A BMP requiring proper herbicide storage and application, as required in mitigation measure **WORKER SAFETY-6,** would mitigate potential risks to workers from exposure to herbicides and reduce the chance that herbicides would contaminate either surface water or groundwater. The BMP should follow either the guidelines established by the EPA (EPA 1993), or more recent guidelines established by the State of California or EPA. Mitigation measure **BIO-13** also guides the application of herbicides in accordance with the Weed Management Plan.

Additional Mitigation Measures

Protecting construction workers from injury and disease is one of the greatest challenges today in occupational safety and health. The following facts are reported by NIOSH:

- More than seven million persons work in the construction industry, representing 6% of the labor force. Approximately 1.5 million of these workers are self-employed;
- Of approximately 600,000 construction companies, 90% employ fewer than 20 workers. Few have formal safety and health programs;
- From 1980-1993, an average of 1,079 construction workers were killed on the job each year, with more fatal injuries than any other industry;
- Falls caused 3,859 construction worker fatalities, or 25.6% of the total, between 1980 and 1993;
- 15% of workers' compensation costs are spent on construction-related injuries;
- Ensuring safety and health in construction is a complex task involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity to one another;

- In 1990, Congress directed NIOSH to conduct research and training to reduce diseases and injury among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a construction safety supervisor to ensure a safe and healthful environment for all workers. This has been evident in the audits of power plants recently conducted by the Energy Commission. The Federal OSHA has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as construction safety supervisors, construction health and safety officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors to improve their safety and health performance; to assist them in striving to eliminate the four major construction hazards (falls, electrical, caught in/between, and struck-by hazards) that account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections; to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and to recognize subcontractors that have exemplary safety and health programs.

There are no OSHA or Cal-OSHA requirements that an employer hire or provide for a construction safety officer. OSHA and Cal-OSHA regulations do, however, require that safety be provided by an employer and the term “Competent Person” appears in many OSHA and Cal-OSHA standards, documents, and directives. A “Competent Person” is defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, mitigation measure **WORKER SAFETY-3** would require the applicant/project owner to designate and provide for a project site construction safety supervisor.

As discussed above, the hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like gas-fired power plants.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the recent past because of both the failure to recognize and control safety hazards and the inability to adequately monitor compliance with occupational safety and health regulations. Safety problems have been documented by the Energy Commission in safety audits conducted in 2005, at several power plants under construction. The findings of the audit include, but are not limited to, safety oversights like:

- Lack of posted confined-space warning placards/signs;
- Confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;

- Confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to the commissioning team, and then to operations;
- Dangerous placement of hydraulic elevated platforms under one another;
- Inappropriate placement of fire extinguishers near hotwork;
- Dangerous placement of numerous power cords in standing water on the site, increasing the risk of electrocution;
- Inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility, but too close to the perimeter fence; and
- Lack of adequate employee or contractor written training programs that address the proper procedures to follow in the event of the discovery of suspicious packages or objects either onsite or offsite.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to require a professional Safety Monitor on-site to track compliance with Cal-OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to the operations agency. These requirements are outlined in mitigation measure **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner but reporting to the CBO, CPM, and BLM's Authorized Officer, will serve as an extra set of eyes to ensure that safety procedures and practices are fully implemented during construction at all power plants certified by the Energy Commission. During audits conducted by the Energy Commission, most site safety professionals welcomed the audit team and actively engaged them in questions about the team's findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provides a “fresh perspective” of the site.

4.15.5 Summary

By implementing the described construction safety and health and project operations and maintenance safety and health programs, as required by mitigation measures **WORKER SAFETY -1**, and **-2**; and fulfilling the requirements of mitigation measures **WORKER SAFETY-3** through**-6**, the proposed project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable laws and regulations. Information initially received from the SBCFD indicated that the proposed project would not have adverse impacts on local fire protection and emergency response services. However, the County has provided additional information, in the form of comments on the DEIS, indicating that such an adverse impact may exist. In an attempt to rectify the contradictory information provided by the SBCFD, BLM submitted a letter to the County requesting additional information on the specific impacts, and the County's financial estimate. As of the time of publication of this FEIS, the requested information has not been received. Although such impacts to County services may occur, neither BLM nor the County has a legal mechanism in place to require the applicant to provide funding to the County to address this impact.

Overall, by following regulatory requirements and proposed mitigation measures, there would be no potential impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any hazards associated with worker safety would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration of construction, and reduced volume of materials requiring demolition. The risk of wildfire damage to the facility would be the same for the Mitigated Ivanpah 3 Alternative and the proposed project.

Table 4.15-2
Comparison of Worker Safety and Fire Protection Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Worker safety	No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	Lower than proposed project, higher than No Action. No potential impact with regulatory compliance and mitigation measures	No potential impact
Fire hazards	No potential impact with vegetation management procedures	No potential impact with vegetation management procedures	No potential impact with vegetation management procedures	No potential impact
Impacts to fire and emergency response resources	Contradictory information received, adverse impact may exist.	Contradictory information received, adverse impact may exist.	Contradictory information received, adverse impact may exist.	No potential impact

4.16 Geology, Paleontology, and Minerals

Introduction

This section discusses the potential impacts of geologic hazards on the proposed ISEGS as well as geologic, mineralogical, and paleontological resources. The objective of the analysis in this section is to ensure that there will be no consequential adverse impacts to geological, mineralogical, and paleontological resources during the project construction, operation, and closure and that operation of the plant will not expose occupants to high-probability geologic hazards. Brief geological, mineralogical, and paleontological overviews are provided. The section includes monitoring and mitigation measures for geologic hazards and geologic, mineralogical, and paleontological resources.

Response-Specific Project Description

The proposed ISEGS would be constructed in three phases on a total of approximately 4,072.5 acres (6.4 square miles) located approximately 4.5 miles southwest of the California/Nevada border and Primm, Nevada, and 1 to 3.5 miles west of Interstate Highway 15 in San Bernardino County, California. The proposed project would be located entirely on federal land administered by the BLM, and is roughly 1.6 miles west of Ivanpah Lake, a predominantly dry playa lakebed. The power plants would be capable of generating a total 400 MW of electricity from the three separate electrical generating sites. Ivanpah 1, 2 and 3 will occupy the southern, central and northern portions of the overall site, respectively. Ivanpah 1 and 2 would consist of one heliostat (mirror) array that would focus sunlight onto one solar power tower receiver, and Ivanpah 3 would consist of five heliostat arrays focusing sunlight onto one solar power tower in the center of each of the five arrays. Steam produced by solar boilers would be fed to a single Rankine-cycle reheat steam turbine adjacent to each power tower. A natural gas-fired boiler would used for start-up and during periods of temporary cloud cover, but use would not exceed 4 hours on any given day.

A new 115/220-kV substation would be constructed between Ivanpah 1 and 2 by SCE adjacent to existing transmission lines. New 115 kV transmission lines would connect each power plant to the SCE grid at the new Ivanpah Substation. Auxiliary components include air-cooled condensers, water storage tanks, deaerators, back-up generators, and switchyards. Ancillary facilities include two water wells, a water treatment system, a septic system for disposal of sanitary wastewater, and an administration / maintenance / control building. A total of approximately 6 miles of 4- to 6-inch diameter natural-gas pipeline, most of which would be installed within the project boundaries, would connect to an existing Kern River Gas Transmission line located approximately 0.5 mile north of Phase 3. A total of approximately 8 miles of optic cable line would be installed both overhead on the existing Nipton 33-kV or 12-kV distribution line poles and through new underground conduits in two segments: between the Ivanpah substation and the Mountain Pass substation and from Mountain Pass substation to a designated local telecommunication carrier interface point approximately 1.5 miles away.

Applicable Laws, Regulations, and Supplemental Authorities

Applicable laws and regulations are listed in the AFC (CH2M Hill, 2007). The following briefly describes the current laws and regulations for both geologic hazards and resources and mineralogical and paleontological resources.

Table 4.16-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Laws or Regulations	Description
Federal	
Federal Land Policy and Management Act of 1976	Provides for the immediate and future protection and administration of public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality. This Statute requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of Scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources and archeological values.
General Mining Law of 1872	Declared all valuable mineral deposits in lands belonging to the United States to be free and open to exploration and purchase. This law remains the method for disposal of minerals in Federal lands that are not specifically provided for in later mineral leasing and sales laws.
Materials Act of July 31, 1947	Authorizes the sale of certain materials, including sand, stone, gravel, and common clay from public lands, if not otherwise expressly authorized or prohibited by law.
Surface Resources Act of 1955	Defined common varieties of sand, stone, gravel, and other materials and authorized the Government to manage and dispose of any land and surface resources that are not incident to mining on unpatented mining claims.
Mining Claims Rights Restoration Act of August 11, 1955	Permits the mining, development, and utilization of mineral resources on all public lands withdrawn or reserved for power development.
Classification and Multiple Use Act of 1964	Authorized the Secretary of the Interior to classify and Manage Bureau of Land Management land for retention or disposal, and for multiple use, including specification of dominate uses and preclusion of inconsistent uses in an area.
Mining and Mineral Policy Act of 1970	Declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.
California Desert Conservation Area Plan	Defines multiple-use classes for BLM-managed lands in the CDCA, which includes the land area encompassing the proposed project location.
Northern and Eastern Mojave Desert Management Plan Amendment	The purpose of this amendment to the CDCA Plan was to evaluate land use changes necessary to protect threatened and endangered species.
Antiquities Act of 1906 (16 United States Code, 431-433	The proposed ISEGS is located entirely on federal (BLM) land. Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR Part 3], 'objects of antiquity' has been interpreted to include fossils by the NPS, the BLM, the U.S. Forest Service (USFS), and other Federal agencies. All design will also need to adhere to any applicable BLM design standards.

Applicable Laws or Regulations	Description
Omnibus Bill (HR 554) and Paleontological Resources Preservation Act, of March 30, 2009	Provides for the protection and preservation of Paleontological Resources.
Title 43 Code of Federal Regulations	Regulates the management of Public Lands.
State	
California Building Code (2007)	The CBC (2007) includes a series of standards that are used in project investigation, design, and construction (including grading and erosion control). The CBC has adopted provisions in the International Building Code.
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), Section 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings. The site is not located within a designated Alquist-Priolo Fault Zone.
The Seismic Hazards Mapping Act, PRC Section 2690–2699	Areas are identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches.
PRC, Chapter 1.7, Sections 5097.5, 5097.9 and 30244	Regulates removal of paleontological resources from state lands, defines unauthorized removal of fossil resources as a misdemeanor, and requires mitigation of disturbed sites.
Warren-Alquist Act, PRC, Sections 25527 and 25550.5(i)	The Warren-Alquist Act requires the Energy Commission to "give the greatest consideration to the need for protecting areas of critical environmental concern, including, but not limited to, unique and irreplaceable scientific, scenic, and educational wildlife habitats; unique historical, archaeological, and cultural sites…" With respect to paleontological resources, the Energy Commission relies on guidelines from the Society for Vertebrate Paleontology, indicated below.
California Environmental Quality Act, PRC Sections 15000 et seq., Appendix G	Mandates that public and private entities identify the potential impacts on the environment during proposed activities. Appendix G outlines the requirements for compliance with CEQA and provides a definition of significant impacts on a fossil site.
Society for Vertebrate Paleontology (SVP), 1995	The "Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures" is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. The measures were adopted in October 1995 by the SVP, a national organization of professional scientists.
California Surface Mining and Reclamation Act (SMARA)	Requires local governments with California to regulate mining operations, and to develop planning policies that balance mineral production with maintenance of environmental quality.
Local	
San Bernardino County General Plan	Mandates compliance with a number of development standards, including safety requirements. The county also incorporates standards and provisions established by the CBC (2007). The San Bernardino County General Plan is not applicable to projects on Federally-owned public lands

Applicable Laws or Regulations	Description
San Bernardino County 2007 Development Code, Chapter 82.20	Defines criteria for site evaluation for paleontological and cultural resources in the county, including preliminary field surveys, monitoring during construction, and specimen recovery; also defines qualifications for professional paleontologists.
California Surface Mining and Reclamation Act	San Bernardino County is the lead agency for SMARA within the County, and issues permits and regulates salable mineral operations.

4.16.1 Affected Environment

Regional Geological Setting

The ISEGS site is located at the east end of the Mojave Desert in Southern California. The region is part of the Mojave Desert geomorphic province (Norris and Webb 1990), and the solar plant site is in the northeast corner near the boundary with the Basin and Range geomorphic province. Mountain ranges in the Mojave Desert are composed of complexly faulted and folded crystalline, metamorphic, volcanic, and carbonate basement rocks that range in age from pre-Cambrian to Mesozoic. Volcanic and sedimentary rocks deposited in the Cenozoic are common as well.

Younger faulting in the eastern half of the Mojave Desert geomorphic province is characterized by generally north- to northwest-trending normal faults associated with regional extension in the Great Basin. Detachment faults, which are large-scale normal listric faults that flatten at depth, are common in the eastern Mojave Desert of California and Southern Nevada. Thick, nearly flat-lying breccia zones that juxtapose rocks on a regional scale have been identified as the deep portions of these detachment faults, and attest to the depth of erosion in the region. Localized right-lateral strike-slip movement associated with the normal faulting is common in the eastern Mojave Desert. Extensional tectonics is predominant in the Great Basin geomorphic province to the north, although some northwest-striking right-lateral strike-slip faulting, which may or may not be associated with normal faulting, is present. Rapid subsidence has occurred in pull-apart basins, such as the Death Valley depression, in response to strike-slip faulting (Norris and Webb 1990; Wright and others 1999). Strike-slip tectonics may also be partially responsible for the development of Shadow Valley, located southwest of the Clark Mountain Range, during the Miocene (Prave and McMackin 1999).

Geology in the Clark Mountain Range, located west of the ISEGS site, is characteristic of both the Mojave Desert and Great Basin geomorphic provinces. A major thrust fault, the Keystone Thrust, which was active in the late Jurassic to early Cretaceous, has juxtaposed Paleozoic marine carbonate sediments over rocks typical of a continental setting (USGS 2006). The carbonates were deposited in a miogeoclinal environment, which, along with the Mesozoic age (Cordilleran orogeny) thrust fault relationship, is characteristic of the Basin and Range geomorphic province (USGS 2006; Norris and Webb 1990). The southernmost occurrence of these miogeoclinal basin fill sediments that is in thrust fault contact over continental rocks occurs in the Clark Mountain Range.

Mesozoic granitic, metamorphic, volcanic and sedimentary rocks in the Mojave Desert to the southwest are more typical of a magmatic arc tectonic setting.

The Clark Mountain Range, which reaches an elevation of 7,930 feet, is bounded on the west side by the Halloran Hills Detachment Fault (Fowler and Calzia 1999). The core of the range has remained unaffected by regional extension. The Kingston Range to the west and the McCullogh Mountains to the east, however, have been affected by extension and detachment faulting that has been dated as Miocene age between 16.5 and 11.0 million years (Ma) (USGS 2006). The Clark Mountain Range appears to be a high-standing, partially detachment fault-bounded, undeformed zone that remained after major east- and west-directed detachment faulting occurred. The adjacent Ivanpah Valley, with a lakebed elevation of 2,602 feet could be primarily a product of the same relatively recent regional extension and normal listric faulting. Speculation that Shadow Valley, located on the opposite side of the Clark Mountain Range from Ivanpah Valley, is a Miocene basin that developed in partial response to strike-slip faulting (Prave and McMackin, 1999) complicates the picture. The Pahrump Valley Fault Zone and the Stateline Fault, which are interpreted to have a strike-slip sense of motion, border the east side of Ivanpah Valley. Strike-slip faulting, therefore, could be partly responsible for the formation of Ivanpah Valley, although extensional tectonics remains the primary factor.

The Cima Volcanic Field is located southwest of the ISEGS site beyond the Clark Mountain Range. The nearest cinder cone is approximately 15.5 miles away. Basaltic eruptions within the volcanic field have occurred about 330 to 480 years before present (CDMG 1994).

Geological Description of the Project Site

The power plant site is located on a broad alluvial bajada deposited on the eastern flank of the Clark Mountain Range. The site is situated on the west side of Ivanpah Valley, which extends northward into Las Vegas Valley. Clasts of alluvial and fluvial origin are predominantly composed of pre-Cambrian to Mesozoic granitic, metamorphic and carbonate rocks derived from sources located roughly 1 to 2.5 miles to the west and north (CDMG 1961; CDMG 1967; USGS 2006). The Quaternary sediments overlie rocks of similar age and composition to the source rocks in the Clark Mountain Range. Outcrops of carbonate and metamorphic rocks to the west of Ivanpah 3 and northeast of Ivanpah 2, respectively, indicate that alluvial fan thickness is relatively thin in the area. However, boreholes in Ivanpah 2, which were advanced to depths up to 80 feet, did not encounter bedrock (Terracon 2007). Subsurface information is not available in the immediate vicinity of Ivanpah 1 and 3.

The Quaternary alluvium mapped across all power plants of the proposed solar plant can be grouped into two major categories based on composition of the sand and gravel clasts. Sediments composed of fine sand to boulders derived from multiple sources, including granitic, metamorphic and carbonate rocks, are present at the surface in the northern half of Ivanpah 1 and the northwest half of Ivanpah 3 (USGS 2006). All other areas are mapped as alluvium that contains coarse sand to fine gravel of predominantly granitic composition (grus). Young alluvium of both types is late Pleistocene to Holocene in age and characterized by poorly cemented and consolidated sediments with poorly developed soil horizons and desert pavement. Older young alluvium (latest Pleistocene to early Holocene) is slightly more weathered than young alluvium and contains localized weak soil and desert varnish development. Intermediate alluvial fan deposits occur only in the northwest corner of Ivanpah 3, and are middle to late Pleistocene in age. The sediments are composed of silt, sand, gravel, cobbles and boulders, and are moderately to strongly weathered with a dark brown surface clayey horizon. Desert pavement is moderately to well developed, and desert varnish is moderate to strong (USGS 2006).

Two exploratory borings were drilled within the limits of Ivanpah 2 to depths of 80 feet (Terracon 2007). Medium dense to very dense granular soils, including silty sand with gravel and silty gravel with sand, were the predominant materials encountered. Clayey sand occurred only locally, in boring B-1 (7 to 15 feet) and boring B-2 (3 to 4 feet). All soils are typical alluvial fan sediments. No fine-grained or clay soils typical of deposition in a lacustrine environment were observed. The lowest blowcount recorded was 21 blows/foot, and all but four blowcounts were above 30 blows/foot, indicative of generally dense granular soils. Sieve analyses yielded 8.4 to 16.4 percent non-plastic fines and 3.8 to 20.3 percent gravel in silty sands. Groundwater was not encountered in either boring.

Two small bedrock hills are located adjacent to Ivanpah 2 and 3. All literature sources agree that the small ridge of carbonate rocks to the west of Ivanpah 3 is Paleozoic in age, and the hills composed of metamorphic rocks to the northeast of Ivanpah 2 are early pre-Cambrian to Cambrian in age (CDMG 1961; CDMG 1967; CH2M Hill 2007). Jennings (CDMG 1961) maps the carbonate rocks as undivided marine limestone and dolomite of either the Riggs Formation, which occurs only in the Silurian Hills to the northwest beyond the Clark Mountain Range, or the early Cambrian to Devonian Goodsprings Dolomite. Exposures of the Goodsprings Dolomite, which is described as a dark gray, fine-grained, thick-bedded and locally mottled dolomite (CDMG 1961; CDMG 1967), are abundant in the Clark Mountain Range several miles north of the project site (CDMG 1967). The unit generally lacks fossils, except for echinoderm plates. The Geologic Hazards section of the AFC (CH2M Hill 2007) also refers to the carbonate bedrock adjacent to Ivanpah 3 as Goodsprings Dolomite. However, the Paleontological Resources section interprets the rocks to be part of the Bonanza King Formation, which is similarly fine-grained, thick-bedded and devoid of fossils, based on field examination of the outcrops (CH2M Hill 2007). The Cambrian Bonanza King Formation does occupy the same relative stratigraphic position as the Goodsprings Dolomite (CDMG 1967; Miller and Walker, 2002).

McCleod (2007) speculates that the carbonate bedrock belongs to the Mississippian age Monte Cristo Limestone or Pennsylvanian age Bird Spring Formation. Both units are mapped in the Clark Mountain Range to the north (CDMG 1961; CDMG 1967). The basal portions of the Bird Spring Formation and certain members of the Monte Cristo Limestone contain abundant marine fossils. The lack of fossils in the outcrop near the project site makes positive determination of the age and formation of the rocks difficult.

The east half of the Clark Mountain Range is mapped as much older pegmatite dikes and gneisses of granitic composition that could be Archean in age (CDMG 1961; CDMG 1967). The hills northeast of Ivanpah 2 are composed of gray quartzites and other metamorphic rocks that are undifferentiated in most literature sources. The rocks are tentatively assigned to the lower Cambrian Zabriskie Quartzite in the Paleontological Resources section of the AFC (CH2M Hill 2007) based on field observations. Although the unit is not mapped in the Clark Mountain Range in the vicinity of the project, the Tapeats Sandstone is a red quartzite of Cambrian age mapped north of the nearby Mesquite Pass (CDMG 1967). The Tapeats Sandstone occupies the same stratigraphic position as the Zabriskie Quartzite (CDMG 1967; Miller and Walker 2002).

Several active and potentially active faults related to regional strike-slip faulting to the west and north, as well as to extensional tectonics in the Great Basin and eastern Mojave Desert, are present within 100 miles of the ISEGS project area. EQFAULT™ Version 3.00, a computer program for the deterministic estimation of peak site acceleration using three-dimensional articulated planar elements (faults), was used to model seismogenic sources (Blake 2006). The site latitude and longitude inputs were 35.5588 degrees and -115.4672 degrees, respectively, which is centrally located in Ivanpah 2. The search radius was 100 miles. The attenuation relationship used was that recommended by Boore, et al. (1997) for Site Class D. The various faults are listed in **Table 4.16-1**, along with the distance from the project site and maximum earthquake magnitude. The peak acceleration and estimated intensity the site would experience during a maximum magnitude earthquake on each fault is also given. The fault locations can be found on the Fault Activity Map of California (CDMG 1994).

Table 4.16-2
Active Faults in the Project Area

Fault Name, Zone or System	Approximate Distance (mi [km])	Estimated Maximum Earthquake Event		
		Maximum Earthquake Magnitude (Mw)	Peak Site Surface Acceleration (g)	Estimated Site Intensity (Modified Mercali Scale)
Death Valley (South)	51.3 (82.5)	7.1	0.080	VII
Garlock (East)	51.3 (82.6)	7.5	0.098	VII
Owl Lake	67.0 (107.9)	6.5	0.047	VI
Pisgah-Bullion Mountain – Mesquite Lake	76.8 (123.6)	7.3	0.065	VI
Death Valley (Graben)	79.6 (128.1)	7.1	0.069	VI
Panamint Valley	80.9 (130.2)	7.4	0.065	VI
Calico – Hidalgo	84.1 (135.4)	7.3	0.060	VI
Landers	92.3 (148.6)	7.3	0.056	VI
Emerson South – Copper Mountain	93.3 (150.1)	7.0	0.047	VI
Gravel Hills – Harper Lake	94.4 (151.9)	7.1	0.050	VI
Blackwater	94.6 (152.3)	7.1	0.049	VI
Johnson Valley (Northern)	97.9 (157.6)	6.7	0.039	V
Tank Canyon	98.7 (158.9)	6.4	0.040	V
Lenwood-Lockhart-Old Woman Springs	99.2 (159.6)	7.5	0.059	VI

Table 4.16-2 presents only the active faults with Holocene age (less than 10,000 years) activity. One northwest-striking fault, the Stateline Fault, has had movement in the early to middle Pleistocene (700,000 to 1,600,000 years) (CDMG 1994). The fault is located approximately 4.5 miles to the northeast, and closely follows the California-Nevada border. The Stateline Fault is the southern segment of the Pahrump Valley Fault Zone, which has been interpreted to be a right-lateral strike-slip structure with some vertical movement (USGS 2006). The fault borders the east side of Ivanpah Valley, and crosses the valley north of the solar plant site. No other fault with Pleistocene activity is present within 35 miles of the proposed solar plant. Numerous older bedrock faults are mapped in all mountain ranges, including the Clark Mountain Range, in the eastern Mojave Desert, but are not considered to be active. The Ivanpah Fault, which is shown by the CDMG (1961 and 1994) to be concealed beneath Quaternary sediments of Ivanpah Valley, is located roughly 4,500 to 5,500 feet southwest of the site. The fault separates predominantly pre-cambrian granitic and metamorphic rocks in the western portion of the Clark Mountain Range from Paleozoic carbonates in the eastern half (CDMG 1961; CDMG 1967). Several bedrock faults have also mapped on the small metamorphic rock outcrop just northeast of Ivanpah 2 (CDMG 1961).

As discussed in Section 4.10, groundwater depth on the ISEGS site is not precisely known. The only local information available indicates that groundwater does not occur within 80 feet of the existing ground surface at two boring sites within the limits of Ivanpah 2 (Terracon 2007). The areas of the project that lack subsurface information would be investigated to establish depths to groundwater and bedrock, as well as other geologic conditions, per CBC (2007) requirements and mitigation measure **GEO-1**. Data from wells within Ivanpah Valley, which was obtained from the California Department of Water Resources (CDWR 2004), show high historic groundwater levels at 367, 90, 24 and 85 feet in the south central, central, western margin and north central parts of the basin, respectively. Levels have fluctuated between 6 and 8.5 feet since about 1916-1917.

Local subsidence in the form of sinkholes has been observed at the site and along the northern edge of Ivanpah Dry Lake. While its potential cause can sometimes be attributed to groundwater withdrawal as well as other causes, in this case, the cause is believed to be from dehydration of clays between the soil surface and the water table that can result in a major loss of volume, and thus the collapse of overlying soils (Broadbent 2009). The potential for such shrinkage to affect structural components will need to be mitigated through facility design.

4.16.2 Environmental Consequences

This section considers two types of impacts. The first is geologic hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geologic, mineralogical, and paleontological resources in the area.

Methodology

The environmental analysis in this section evaluates the following issues:

- Whether or not a project will either directly or indirectly destroy a unique paleontological resource or site, or a unique geological feature.
- Whether or not the project would expose persons or structures to geologic hazards.
- Whether or not a project will impact the availability of mineral resources.

The California Building Standards Code (CBSC) and CBC (2007) provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criteria used to assess the significance of a geologic hazard include evaluating each hazard's potential impact on the design and construction of the proposed facility. Geologic hazards include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, and seiches.

BLM has reviewed geologic and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if geologic and mineral resources exist in the area. BLM also reviewed the operating procedures of the proposed facility, in particular groundwater extraction and mass grading, to determine if those operations could adversely affect geologic and mineralogical resources. The evaluation of mineral resource impacts considered the following questions:

A. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state?

B. Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

Under NEPA, the impact of the proposed project and alternatives on mineral resources would be considered adverse if they would directly or indirectly interfere with active mining claims or operations, or would result in reducing or eliminating the availability of important mineral resources.

The Antiquities Act of 1906 (16 United States Code) requires that objects of antiquity be taken into consideration for federal projects. The Paleontological Resources Preservation Act of 2009 requires the Secretaries of the United States Department of the Interior and Agriculture to manage and protect paleontological resources on Federal land using scientific principles and expertise. The potential for discovery of paleontological resources or the impact of surface disturbing activities to such resources is assessed using the Potential Fossil Yield Classification (PYFC) system. This system includes three conditions (Condition 1 [areas known to contain vertebrate fossils]; Condition 2 [areas with exposures of geological units or settings that have high potential to contain vertebrate fossils]; and Condition 3 [areas that are very unlikely to produce vertebrate fossils]). The PYFC class ranges from Class 5 (very high) for Condition 1 to Class 1 (very low) for Condition 3.

The mitigation measures identified below allow BLM's Authorized Officer, the CPM, and the applicant to adopt a compliance monitoring scheme ensuring compliance with laws and regulations applicable to geologic hazards and the protection of geologic, mineralogical, and paleontological resources.

4.16.2.1 Proposed Project

The main geologic hazards at this site include ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the possible presence of expansive clay soils. The potential hazards can be effectively mitigated through facility design as required by the California Building Code (2007) and mitigation measure **GEO-1**. Energy Commission Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** (see **Appendix C – Facility Design**), are also intended to avoid or reduce these impacts.

The AFC (CH2M Hill 2007) provides documentation of potential geologic hazards at the ISEGS plant site, although no site-specific subsurface information was available for Ivanpah 1 and 3 at the time the AFC was submitted. Review of the AFC, coupled with independent research, indicates that the possibility of geologic hazards affecting the operation of the plant site during its practical design life is low. However, geologic hazards, such as strong ground shaking during seismic events; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and expansive clay soils must be addressed in a project geotechnical report per CBC (2007) requirements and mitigation measure **GEO-1**.

Independent research included the review of available geologic maps, reports, and related data of the ISEGS plant site. Geological information was available from the California Geological Survey (CGS), California Department of Water Resources (CDMG), and other governmental organizations.

Faulting and Seismicity

BLM reviewed the CDMG publication *Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions* (1994) and Alquist-Priolo Special Studies Zone mapping and reports (CDMG 2003; CGS 2002; and Hart and Bryant, 1999). No active faults are shown on published maps as crossing the boundary of new construction on the proposed ISEGS site or in the vicinity of the proposed gas pipeline. The closest mapped active faults to the plant site are the Death Valley Fault Zone and Garlock Fault located approximately 51 miles to the west. Movement on the north-northwest-striking Death Valley Fault is normal, related to extensional tectonics in the Great Basin, coupled with right-lateral strike-slip, related to San Andreas-style transform faulting. The Garlock Fault is a major east-west-striking, left-lateral strike-slip fault, also associated with regional transform faulting to the west. One northwest-striking fault, the Stateline Fault, has had movement in the early to middle Pleistocene (700,000 to 1,600,000 years) (CDMG 1994). The fault is located approximately 4.5 miles to the northeast, and closely follows the California-Nevada border.

Table 4.16-2 lists all Holocene age faults within 100 miles of the solar plant site. The majority, including the Pisgah-Bullion Mountain-Mesquite Lake, Calico-Hidalgo, Landers, Emerson-Copper Mountain, Gravel Hills-Harper Lake, Blackwater, Johnson Valley, and Lenwood-Lockhart-Old Woman Springs Faults, are right-lateral strike-slip faults similar in style and orientation to the San Andreas Fault. These structures are located in the western Mojave Desert. The Panamint Valley Fault is located east of the Death Valley Fault Zone, and sense-of-movement and orientation are similar. The Owl Lake Fault, which strikes northeast, and the Tank Canyon Fault, which is a north-striking reverse fault, appear to be associated with the regional left-lateral Garlock Fault.

The Garlock Fault is the only structure designated as a Type A fault (CDMG 1994; ICBO 1998). All others listed in **Table 4.16-2** are Type B. Type A faults have slip-rates of ≥5 mm/yr and are capable of producing an earthquake of magnitude 7.0 or greater. Type B faults have slip-rates of 2 to 5 mm/yr and are capable of producing an earthquake of magnitude 6.5 to 7.0.

The Alquist-Priolo Act of 1973 and subsequent California state law (California Code of Regulations, 2001) require that all occupied structures be set back 50 feet or more from the surface trace of an active fault. Since no active faults have been documented within the ISEGS power plant site, setbacks for occupied structures would not be required.

Estimates of potential seismic ground motion generated using the Seismic Hazard Curves, Response Parameters and Design Parameters software found at the United States Geological Survey website (http://eartquake.usgs.gov/research/hazmaps/design) indicate that the peak bedrock ground acceleration is expected to be 0.15g at the site. The resulting deterministic peak surface accelerations on the site for each fault are summarized in **Table 4.16-3**.

Table 4.16-3
Estimated Deterministic Peak Surface Accelerations

Latitude North	Longitude West	Date	Depth (km)	Earthquake Magnitude	Peak Site Surface Acc. (g)	Site Modified Mercali Scale Intensity	Approx. Distance (mi [km])	Location of Epicenter
36.000	117.000	11/04/1908	0.0	6.5	0.045	VI	91.1 (146.6)	Southwest of Death Valley, CA
36.000	117.000	11/10/1916	0.0	5.5	0.027	V	91.1 (146.6)	South of Death Valley, CA
36.705	116.293	06/29/1992	8.0	5.4	0.025	V	91.6 (147.3)	Lathrop Wells, NV
34.516	116.495	06/01/1975	4.5	5.2	0.023	IV	92.5 (148.9)	South of Hector, CA
34.250	116.167	03/20/1945	0.0	5.0	0.019	IV	98.7 (158.8)	East of Landers, CA
35.967	114.817	05/04/1939	0.0	5.0	0.035	V	46.1 (74.1)	Boulder City, NV
34.711	116.027	09/26/1965	8.3	5.0	0.026	V	66.5 (107.1)	S. Bristol Mtns., CA
34.860	116.390	10/21/1999	4.0	5.0	0.025	V	71.0 (114.2)	Hector, CA
34.860	116.410	10/22/1999	1.0	5.0	0.025	V	71.8 (115.6)	Hector, CA

Latitude North	Longitude West	Date	Depth (km)	Earthquake Magnitude	Peak Site Surface Acc. (g)	Site Modified Mercali Scale Intensity	Approx. Distance (mi [km])	Location of Epicenter
34.983	116.550	04/10/1947	0.0	6.2	0.046	VI	72.8 (117.2)	East of Barstow, CA
34.950	116.533	04/10/1947	0.0	5.0	0.024	V	73.6 (118.0)	East of Barstow, CA
34.967	116.550	04/10/1947	0.0	5.1	0.026	V	73.5 (118.2)	East of Barstow, CA
34.967	116.550	04/11/1947	0.0	5.1	0.024	V	73.5 (118.2)	East of Barstow, CA
34.800	116.410	10/21/1999	0.0	5.0	0.024	V	74.7 (120.2)	Hector, CA
34.680	116.280	10/16/1999	8.0	5.8	0.036	V	76.1 (122.4)	Southeast of Hector Mine, CA
34.533	115.983	07/18/1946	0.0	5.6	0.032	V	76.6 (123.3)	N. Bullion Mtns., CA
34.800	116.520	09/26/1929	0.0	5.1	0.024	V	77.8 (125.3)	Hector, CA
34.594	116.271	10/16/1999	0.0	7.1	0.068	VI	80.6 (129.7)	Southeast of Hector Mine, CA
34.583	116.319	07/05/1992	0.0	5.4	0.027	V	82.8 (133.2)	Southeast of Hector, CA
34.712	116.503	09/25/1965	10.6	5.2	0.025	V	82.7 (133.1)	South of Hector, CA
34.970	116.819	03/18/1997	1.0	5.1	0.023	IV	86.4 (139.0)	Calico Mtns., CA
34.333	115.800	12/22/1943	0.0	5.5	0.028	V	86.7 (139.5)	Bullion Mtns., CA
34.442	116.248	10/16/1999	1.0	5.7	0.030	V	88.9 (143.0)	Southeast of Hector Mine, CA

EQSEARCH™ Version 3.00 software was used to search an abbreviated and modified version of the published CGS earthquake catalog for California in order to obtain the information presented in **Table 4.16-3** (Blake 2006). The site latitude and longitude inputs were 35.5588 degrees and -115.4672 degrees, respectively, which is centrally located in Ivanpah 2. The range of historic earthquake magnitudes selected was 5.0 to 9.0, and the search radius was 100 miles. The location of each seismic event was obtained from the USGS 7.5 Minute Topographic Map Series and the California Historical Earthquake Online Database (http://www.consrv.ca.gov/cgs/rghm/quakes/historical/).

Twenty-three historic earthquakes of Magnitude 5.0 (M5.0) or greater have occurred on active faults between 51 and 100 miles of the site (CGS 2007). Only three of these, with epicenters located near the Hector Mine (M7.1), southwest of Death Valley (M6.5) and east of Barstow (M6.2), were of Magnitude 6.0 or greater. Nearly all of the faults are predominantly associated with strike-slip faulting. The earthquakes in the Death Valley region resulted from a combination of extensional and strike-slip faulting. The earthquake at Lathrop Wells, Nevada occurred in the vicinity of an east-west-striking left-lateral strike-slip fault within the poorly understood Southern Nevada Seismic Zone that extends eastward across Nevada from the Death Valley area (NBMG 1998).

The appropriate soil profile for Ivanpah 2 is Type D based on information contained in the project geotechnical report (Terracon 2007). Depth to bedrock is expected to vary across the site, so the soil profile is also assumed to be Type D for Ivanpah 1 and 3. A design-level geotechnical report, as required by mitigation measure **GEO-1**, is needed to confirm the soil profile and provide appropriate seismic design parameters.

The estimated peak horizontal bedrock acceleration for the power plant is 0.084 times the acceleration of gravity (0.084g) based on a 10 percent probability of exceedence in 50 years, while the estimated peak horizontal bedrock acceleration is 0.152 times the acceleration of gravity (0.152g) based on a 2 percent probability of exceedence in 50 years (CBC 2007).

The Ivanpah Fault is reported to exist beneath the Quaternary sediments and is located roughly 4,500 to 5,500 feet southwest of the site, and the Stateline Fault is reported to be approximately 4.5 miles to the northeast. Based on these locations, neither would be expected to affect ground water, which exists in Quaternary sediments directly beneath the site. The potential for ground rupture at the site remains low since both the Stateline and the Ivanpah faults are distant from the site. While ground acceleration from rupture of the Stateline fault system could be fairly high, the California Building Code establishes a high standard that must be followed for seismic design in the State of California. Because of the low occupancy of this type of power plant, the risk to human life and safety is low, even if a major earthquake were to occur along the Stateline fault.

Liquefaction

Liquefaction is a condition where in a cohesionless soil may lose shear strength because of sudden increase in pore water pressure caused by an earthquake. Medium dense to very dense sandy and gravelly soils encountered in borings in Ivanpah 2, coupled with a groundwater table that is below 80 feet, would indicate no potential for liquefaction; however, no subsurface information was presented in the AFC for Ivanpah 1 and 3 of the ISEGS site such that liquefaction potential for these areas of the project should be addressed in a project-specific geotechnical report as required by the CBC (2007) and mitigation measure **GEO-1**.

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase is soil density). The decrease in volume can result in settlement of overlying structural improvements. Medium dense to very dense granular soils encountered in borings in Ivanpah 2 are not likely to be susceptible to dynamic compaction during an earthquake.

It is not possible to assess the potential for dynamic compaction in Ivanpah 1 and 3 without site-specific geotechnical exploration. The potential for and mitigation of the effects of dynamic compaction of site soils during an earthquake should be addressed in a project-specific geotechnical report as required by the CBC (2007) and mitigation measure **GEO-1**. Common mitigation methods include deep foundations (driven piles; drilled shafts) for severe conditions, geogrid reinforced fill pads for moderate severity and over-excavation and replacement for areas of minimal hazard.

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation dissolves the weak cementation that is preventing the immediate collapse of the soil structure. Medium dense to very dense sands and gravels present in borings in Ivanpah 2 are not generally susceptible to hydrocompaction. It is not possible to assess the potential for hydrocompaction in Ivanpah 1 and 3 without site-specific geotechnical exploration. The potential for and mitigation of the effects of hydrocompaction of site soils should be addressed in a project-specific geotechnical report as required by the CBC (2007) and mitigation measure **GEO-1**. Typical mitigation measures would include over-excavation/replacement, mat foundations or deep foundations, depending on severity and foundation loads.

Subsidence

Consolidation settlement may occur when areas containing compressible soils are subjected to surcharge loads. Although consolidation testing was not performed on soil samples from borings in Ivanpah 2, the coarse-grained soils encountered are not considered highly sensitive to surcharge loading. It is not possible to assess the potential for consolidation settlement in Ivanpah 1 and 3 without site-specific geotechnical exploration. The potential for and mitigation of the effects of consolidation settlement at the site should be addressed in a project-specific geotechnical report as required by the CBC (2007) and mitigation measure **GEO-1**. Mitigation is normally accomplished by over-excavation and replacement of the surifical materials, or by incorporating deep foundations for deeper deposits.

Regional ground subsidence is typically caused by petroleum or groundwater withdrawal that increases the effective unit weight of the soil profile, which in turn increases the effective stress on the deeper soils. This results in consolidation or settlement of the soils. No known petroleum or gas fields are located within hundreds of miles of the project site (CDC 2001) such that subsidence due to petroleum withdrawal is not anticipated. However, regional subsidence associated with shrinkage of clay soils may be occurring (Broadbent 2009), and possible evidence of subsidence has been found on the playa surface to the east of the project site in the form of sinkholes and possible degradation of a portion of the Interstate Highway 15 road base. Subsidence associated with shrinkage of clay soils will need to be addressed in the design-level geotechnical report required by mitigation measure **GEO-1** and mitigated through facility design.

Groundwater pumping can also contribute to regional subsidence. The assessment in Section 4.10 also concludes that groundwater withdrawal is not causing a local lowering of the water table, and thus would not contribute to subsidence.

Expansive Soils

Soil expansion occurs when clay-rich soils with an affinity for water exist in-place at a moisture content below their plastic limit. The addition of moisture from irrigation, capillary tension, water line breaks, etc. causes the clay soils to collect water molecules in their structure, which in turn causes an increase in the overall volume of the soil. This increase in volume can correspond to movement of overlying structural improvements. Although expansion testing was not performed on soil samples from borings in Ivanpah 2, the coarse-grained, generally non-plastic soils encountered are not considered to be expansive. It is not possible to assess the potential for expansive soils in Ivanpah 1 and 3 without site-specific geotechnical exploration. The potential for and mitigation of the effects of expansive soils on the site should be addressed in a project-specific geotechnical report as required by the CBC (2007) and mitigation measure **GEO-1**. Mitigation is normally accomplished by over-excavation and replacement of the expansive soils. For deep-seated conditions, deep foundations are commonly used. Lime-treatment (chemical modification) is often used to mitigate expansive clays in pavement areas.

Landslides

Landslide potential at the ISEGS site is negligible since the proposed energy facility is located on a broad, gently east-sloping alluvial fan.

Flooding

The FEMA has identified the ISEGS site and gas pipeline route as lying in a Zone D, which is an area in which flood hazards are undetermined (FEMA 1997). Flooding potential is further addressed in Section 4.10.

Tsunamis and Seiches

The proposed ISEGS power plant site is not located near a large body of water that could be inundated by a tsunami or seiche, such as a lake or open ocean. As a result, there is no potential for a tsunami or seiche to affect the facility.

Mineral Resources

BLM has reviewed applicable geologic maps and reports for this area (CDC 2001; CDMG 1961; CDMG 1967; CDMG 1987; CDMG 1990; CDMG 1998; CDMG 1999; CH2M Hill, 2007; McCleod, 2007; Scott, 2007; Terracon 2007; and UCMP 2007). The ISEGS site is mapped as Mineral Resource Zone 4 (CDMG 1987). MRZ-4 refers to “areas where geologic information does not rule out either the presence or absence of industrial mineral resources”. The carbonate bedrock outcrop just west of Ivanpah 3 is designated as MRZ-3a, which is an “area underlain by geologic terranes within which undiscovered industrial mineral resources similar to known deposits in the same producing district or region may reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance". These carbonate rocks could be encountered at shallow depths in Ivanpah 3.

There are a variety of active mining operations in the general area near the proposed project location, but no active operations occur within the proposed project boundaries. The closest current mining operation is the Chevron Mining, Inc. Rare Earth facility (formerly Molycorp) located in at Mountain Pass, approximately 8 miles to the west of the proposed project location. Other mining operations that have occurred in the local area in the past include the Colosseum Mine, which produced gold at a location approximately 5 miles west of the proposed project location from 1988 to 1993. Regionally, mineral production includes gold, silver, barite, boron, hectorite, bentonite, gypsum, tungsten, talc, zeolites, sodium, limestone, sand, gravel, stone, and turquoise. The nearest prospects and historic workings are located approximately 8,000 feet northwest of Ivanpah 3 and 12,500 feet southwest of Ivanpah 2 and 3 (CDMG 1987; CDMG 1998). Base metal and limestone prospects are also located roughly 6,000 feet northwest of the northern end of the proposed gas pipeline. A pit is located 7,500 feet east of Ivanpah 1, and is the closest known source of borrow material (USGS 1985).

The proposed project location is located on alluvial fan materials. The general area is potentially leasable, and there has been limited exploration for oil and gas. However, there has been no production, and the area is considered to have low potential for leasable minerals. The nearest oil and gas fields are located at least 75 miles west and southwest of Barstow, California, which is roughly 100 miles to the southwest of the project site (CDC 2001). Some dry lake beds in California are sources of brine and salt production, but Ivanpah Dry Lake is not expected to be a potential resource for these materials.

The presence of alluvial fan materials on the proposed project location means that the property could potentially be accessed a source for of salable sand and gravel resources. During construction, the applicant may need or desire to move sand and gravel either offsite, or between the different units of the facility. Should this occur, the applicant would be required to comply with BLM regulations in at 43 CFR Part 3600, which regulates the production and use of sand and gravel from public lands. Use of sand and gravel or other mineral materials within the boundaries of an authorized ROW is permitted; however, removal of these materials from an authorized ROW would require payment to the US of the fair market value of those materials.

Adjacent to the western boundary of the proposed project location is an outcrop feature known as Limestone Hill. Limestone Hill is the location of two active locatable minerals claims, including a lode claim and a placer claim. These claims are identified as Numbers CAMC234026 and CAMC237293. Underground exploration is being conducted sporadically, however, commercial economic production is not apparent from either claim. The extent of the underground workings is not known.

Although active mining claims exist on Limestone Hill directly adjacent to the proposed property boundary, there are no indications that these would become active economic commercial operations. If they become active economic operations, the existence of the proposed facility is not expected to interfere with the ability of the claimant to access those minerals. The only potential conflict would occur if the claimant or another person locates a new claim for locatable minerals located underneath the proposed project, within the project boundaries. This could potentially occur, as the proposed project location has not been withdrawn from mineral entry. The potential for this scenario is expected to be low. If it did occur, conflicts between the surface use of the land for solar energy production and access to the subsurface minerals would be addressed in accordance with appropriate regulations.

The proposed project site is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals. Sand and gravel resources are present at the site; however, such materials are present throughout the regional area such that the ISEGS should not have an adverse impact on the availability of such resources. In addition, the potential resource would become available again following decommissioning of the project. In addition, only limited exploration for oil and gas resources has been performed in the area, and no active oil or gas operations are located in the immediate vicinity of the project. As a result, the ISEGS project would not impact any current or reasonably foreseeable development of geologic or mineral resources.

Paleontologic Resources

BLM has reviewed the paleontological resources assessment in Section 5.8 of the AFC (CH2M Hill 2007) and the paleontological records search attached in Appendix 5.8A (Scott 2007). BLM has also reviewed the paleontological literature and records search conducted by the Natural History Museum of Los Angeles County (McCleod 2007), as well as the online records database maintained by the University of California, Museum of Paleontology (UCMP 2007). Site-specific information generated by the applicant for the ISEGS was also reviewed. All research was conducted in accordance with accepted assessment protocol (SVP 1995) to determine whether any known paleontological resources exist in the general area. If present or likely to be present, mitigation measures which outline required procedures to mitigate impacts to potential resources would be required as part of the project's approval. Based on a review of this information, no paleontological resources have been documented on the ISEGS plant site or at the proposed lay down area.

Young to intermediate (middle Pleistocene to Holocene) age alluvial fan sediments represent all soils that are mapped at the surface of the ISEGS site. These deposits are considered to have a low paleontological sensitivity due to the high energy environment of deposition and/or are too young to yield fossils of scientific significance. There is a low potential to impact paleontological resources during grading and trenching in such materials (McLeod 2007; Scott 2007). Quaternary lacustrine sediments are considered to have a high paleontological sensitivity because vertebrate and plant fossils have been recovered from deposits east of the project site around Ivanpah Lake and roughly 30 miles to the northwest near Tecopa, California (McLeod 2007; Scott 2007); however, it is unlikely that lake bed sediments are present beneath the site within the anticipated depths of grading and trenching such that there is a low potential to impact paleontological resources in these materials.

The carbonate bedrock west of Ivanpah 3 is assigned a high paleontological sensitivity rating, based on the presence of Late Quaternary packrat middens that occupy solution cavities in the outcrops and the occurrence of time-restrictive marine fauna in late Cambrian rocks in the Clark Mountain Range (UCMP 2007; CH2M Hill 2007; Scott 2007). Since shallow carbonate bedrock may be present in the western portion of Ivanpah 3 and could be encountered during project excavation in this area, there is a high potential to impact paleontological resources in this area. The Pre-Cambrian metamorphic rocks in the bedrock outcrops northeast of Ivanpah 2 is considered to have negligible paleontological sensitivity.

Based on the above discussion, Society of Vertebrate Paleontology (SVP) criteria, and the confidential paleontological report appended to the AFC, the probability that paleontological resources would be encountered during grading and excavation in the western portion of Ivanpah 3 to be high. Mitigation measures **PAL-1** to **PAL-7** are designed to avoid or reduce potential impacts to paleontological resources. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (paleontological resource specialist; PRS).

The extent and distribution of lakebed sediments associated with Ivanpah Lake relative to the solar plant sites is difficult to determine. No fine-grained or clay soils were encountered in the two 80-foot-deep borings at Ivanpah 2. The nearest mapped surface exposure of lacustrine sediments, which are latest Pleistocene to Holocene in age, is roughly 1.35 miles east of Ivanpah 1 (USGS 2006). The lowest elevation on the solar plant site is approximately 2,765 feet above MSL, which is nearly 130 feet above the highest exposure of Quaternary lakebed sediments (approximate elevation 2,638 feet) and 163 feet above the floor of Ivanpah Lake (elevation 2,602 feet). The Nevada Bureau of Mines and Geology (NBMG 1979) has determined that precipitation rates were not high enough to overcome rapid evaporation rates that persisted in the Southern Nevada group of pluvial lakes, of which Ivanpah Lake is a part, during the Wisconsinan pluvial period (late Pleistocene beginning 72,000 years ago). Establishment of perennial lakes of substantial depths for consequential periods of time was unlikely under these environmental conditions. The lack of ancient shoreline features in Ivanpah Valley supports this conclusion (NBMG 1979). Therefore, the probability of impacting paleontological resources in Quaternary lakebed sediments is considered to be low since the lakebed deposits are present at approximate depths of 130 feet below the lowest existing ground surface at the site.

The Pre-Cambrian metamorphic rocks in the bedrock outcrops northeast of Ivanpah 2 are considered to have negligible paleontological sensitivity. However, the carbonate bedrock west of Ivanpah 3 is assigned a high paleontological sensitivity rating, based on the presence of Late Quaternary packrat middens that occupy solution cavities observed during the site investigation conducted for the AFC (CH2M Hill 2007). Packrat middens are known to contain paleobotanical material as old as 40,000 years that is well preserved in the dry Mojave Desert climate (CH2M Hill 2007; Spaulding, 1990). One midden contained remains of juniper or cedar twigs (*Juniperus* sp.), greasebush leaves (*Forsellesia nevadensis*), snowberry twigs and fruit (*Symphoricarpos longiflorus* sp.), and globemallow epidermis (*Sphaeralcea* sp.), most of which are indicative of present-day higher elevation woodland environments. The University of California Museum of Paleontology also possesses 8 specimens of a marine branched thrombolite (*Favosamaceria cooperi*) collected from a location somewhere in the Clark Mountain Range (UCMP 2007). The thrombolite, which is a plant species similar to stromatolites, is restricted to the Late Cambrian *Saukia* Trilobite Zone (Shapiro and Awramik 2006). Many sources agree that the carbonates adjacent to Ivanpah 3 are probably Cambrian in age (CDMG 1961; CH2M Hill 2007). Although no fossils were observed in the limestone/dolomite outcrops, the potential to impact paleontological resources is still considered to be high in excavations that might encounter shallow carbonate bedrock, particularly on the west side of Ivanpah 3. These excavations could uncover packrat middens buried by young alluvium or time-restricted late Cambrian thrombolites in the carbonate rock.

Several paleontological sites are documented in Quaternary lacustrine sediments within 45 miles of the ISEGS project area. The San Bernardino County Museum collection contains remains of tortoise (*Gopherus* sp.), kangaroo rat (*Dipodomys* sp.), wood rat (*Neotoma* sp.), and other small vertebrates from a locality between 1 and 2 miles southeast of the site on the west side of Ivanpah Lake (Scott 2007). The site also yielded hackberry seed (*Celtus* sp.) and tufa deposited in the lake. The Natural History Museum of Los Angeles collection includes several paleontological remains from similar lakebed sediments near Tecopa, California, approximately 45 miles to the northwest. The fossil specimens consist of mastodon (*Mammut*), mammoth (*Mammuthus*), rhinoceros (*Rhinocerotidae*), horse (*Equus*), [rpngjprn antelope (*Antilocapridae*), and camels (*Camelops* and *Capricamelus gettyi*) (McCleod, 2007). *Capricamelus gettyi* is a species of short-legged camel named from specimens found at the Tecopa lakebed site.

Construction Impacts

Geologic Hazards

The design-level geotechnical investigation required for the project by the CBC (2007) and mitigation measure **GEO-1** should provide standard engineering design recommendations for mitigation of potential geologic hazards that include strong ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the presence of expansive clay soils.

Mineral Resources

Construction of the proposed project would directly remove approximately 4,072.5 acres from potential use for sand and gravel production under BLM's salable mineral program. In general, sand and gravel resources are widely available throughout the region. The primary consideration in the economic viability of sand and gravel operations is the transportation cost, which is driven by the proximity of the operation to its point of use. There is likely to be widespread development in Ivanpah Valley that would require sand and gravel resources, removal of the 4,072.5-acre area from potential production is not expected to have any adverse impact. The proposed project site represents a small fraction of the total sand and gravel resource available within the valley. As a result, the

ISEGS project would not impact any current or reasonably foreseeable development of geologic resources. However, during construction, the applicant may need or desire to move sand and gravel either offsite, or between the different units of the facility. Should this occur, the applicant would be required to comply with BLM regulations in at 43 CFR Part 3600, which regulates the production and use of sand and gravel from public lands. Use of sand and gravel or other mineral materials within the boundaries of an authorized ROW is permitted; however, removal of these materials from an authorized ROW would require payment to the US of the fair market value of those materials.

The proposed project would not have any direct or indirect impact on the production of locatable or leasable minerals outside of the proposed project boundaries. Although active mining claims exist on Limestone Hill directly adjacent to the proposed property boundary, there are no indications that these could become economic commercial operations. If they become economic operations, the existence of the proposed facility is not expected to interfere with the ability of the claimant to access those minerals. The only potential conflict would occur if the claimant or another person locates a new claim, for locatable minerals underneath the proposed project, within the project boundaries. This could potentially occur, as the proposed project location has not been withdrawn from mineral entry. The potential for this scenario is expected to be low. If it did occur, conflicts between the surface use of the land for solar energy production and access to the subsurface minerals would be addressed in accordance with appropriate regulations. Therefore, the ISEGS project would not impact any current or reasonably foreseeable development of mineral resources.

Paleontological Resources

Paleontological resources, specifically pack rat middens, have been documented in nearby Paleozoic carbonate bedrock that could be encountered during construction of the Ivanpah 3 plant and linear facilities. The nearest vertebrate fossil locality is 1 to 2 miles away and was recovered from Quaternary lacustrine sediments, although the potential to encounter similar sediments during grading and trenching is low. The young to intermediate age alluvium that underlies the majority of the site, as well as Pre-Cambrian metamorphic rocks located just northeast of Ivanpah 2, are considered to be of low to negligible sensitivity with respect to containing paleontological resources. Construction of the proposed project will include grading, foundation excavation, utility trenching and possibly drilled shafts. The probability of encountering paleontological resources is generally high on portions of the site, particularly the west side of Ivanpah 3, based on the soils profile, SVP assessment criteria, and the near surface occurrence of the sensitive geologic units. The potential for encountering fossils hosted in Quaternary lake bed sediments will increase with the depth of cut. Excavations for ancillary facilities and new pipelines and on-site excavations deeper than five feet may have a higher probability of encountering potentially high sensitivity materials, although sensitive materials could occur nearer the surface.

Mitigation measures **PAL-1 to PAL-7** are designed to mitigate any paleontological resource impacts, as discussed above. Essentially, these conditions require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists (PRS). Earthwork is halted any time potential fossils are recognized by either the paleontologist or the worker. When properly implemented, the mitigation measures yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist is retained, for the project by the applicant, to produce a monitoring and mitigation plan, conduct the worker training, and provide the on the monitoring. During the monitoring, the PRS can and often does petition the the Energy Commission for a change in the monitoring protocol. Most commonly, this is a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

Based upon the literature and archives search, field surveys, and compliance documentation for the ISEGS, the applicant has proposed monitoring and mitigation measures to be followed during the construction of the ISEGS. The facility can be designed and constructed to minimize the effect of geologic hazards at the site during project design life and that impacts to vertebrate fossils encountered during construction of the power plant and associated linear projects would be minimized to the extent feasible.

Operations Impacts

Operation of the proposed plant facilities should not have any adverse impact on geologic, mineralogical, or paleontological resources. Potential geologic hazards, including strong ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction, and the presence of expansive clay soils can be effectively mitigated through facility design (see mitigation measure GEO-1, as well as the Energy Commission Conditions of Certification **GEN-1**, **GEN-5**, and CIVIL-1 in **Appendix C – Facility Design**) such that these potential hazards should not affect operation of the facility.

Closure/Decommissioning Impacts

The decommissioning and closure of the project should not negatively affect geologic, mineralogical, or paleontological resources since the majority of the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project. Facility closure will make land occupied by the proposed project once again available for potential future development of geologic or mineralogical resources within the former project borders.

Beneficial Impacts

Excavation activities during construction of the proposed ISEGS project may uncover important paleontological resources which, with proper collection and curation by the project PRS, would enhance the understanding of prehistoric climate and geography of the region for the benefit of current and future generations.

4.16.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

Paleontological resources could potentially be present in the project area, and therefore could potentially be disturbed during project construction. Potential impacts to these resources for both the proposed project and the Mitigated Ivanpah 3 Alternative would be mitigated through the use of monitoring and assessment procedures. Overall, the magnitude of the potential impact in the Mitigated Ivanpah 3 Alternative would be lower than that for the proposed project, due to the reduced acreage (approximately 12.5 percent lower) as compared to the proposed project. However, the reduction in potential impacts to paleontological resources is expected to be greater than 12.5 percent, due to the nature of the 433-acre area that would be eliminated. Elimination of the 433 acre northern portion of Ivanpah Unit 3 would remove the area of the most intense site disturbance and grading from the project development. As site grading is one of the greatest risk factors potentially threatening paleontological resources, elimination of the area requiring the greatest extent of grading would reduce potential impacts disproportionately to the simple 12.5 percent acreage reduction. Therefore, the Mitigated Ivanpah 3 Alternative would be expected to reduce site disturbance impacts to paleontological resources by more than 12.5 percent over the proposed project.

Operations Impacts

For the proposed project, geologic conditions, including the potential for seismicity, subsidence, and landslides, would present potential impacts to the operation of the proposed project, but these would be mitigated through facility design and compliance with building codes. Because the location of the Mitigated Ivanpah 3 Alternative and the proposed project would be approximately the same, potential threats to the facility caused by seismicity, subsidence, and landslides would be identical.

The proposed project would remove the entire project acreage from potential development of leasable sand and gravel resources. However, due to the large magnitude of these resources in the local area, this removal was not expected to cause an adverse impact to leasable mineral resources. The Mitigated Ivanpah 3 Alternative would leave the northern 433-acre portion of Ivanpah Unit 3 available to mineral development, which could include leasable sand and gravel operations. Therefore, the potential impact on these resources would be lower for the Mitigated Ivanpah 3 Alternative versus the proposed project.

There would be no potential impacts of the proposed project on existing locatable minerals claims on Limestone Hill (Numbers CAMC234026 and CAMC237293). The location of the Mitigated Ivanpah 3 Alternative with respect to these claims would be the same as that of the proposed project, and therefore the potential impact on those claims would be the same.

Closure/Decommissioning Impacts

Closure and decommissioning impacts on geologic, paleontologic, and mineral resources would be associated with site disturbance activities, and would be the same as that described for construction activities. Due to the reduced acreage of disturbance associated with the Mitigated Ivanpah 3 Alternative, potential impacts would be lower than those associated with the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with geology, paleontology, and minerals.

4.16.2.3 Modified I-15 Alternative

Although the inventory of paleontological and mineral resources conducted and summarized by the applicant and evaluated in the DEIS is considered to be relevant and sufficient for most of the Modified I-15 Alternative project area, these inventories and notifications did not include the reconfigured location of Ivanpah Unit 3. Because the reconfigured location has not undergone these evaluations, there may be specific resources associated with that reconfigured location that have not been identified, and therefore impacts to specific resources cannot be evaluated. However, based on knowledge of the area and its environmental setting, there is no reason to suspect the presence of resources that are substantially different from those in nthe proposed project area.

Construction Impacts

Paleontological resources could potentially be present in the project area, and therefore could potentially be disturbed during project construction. Potential impacts to these resources for both the proposed project and the Modified I-15 Alternative would be mitigated through the use of monitoring and assessment procedures. Like the proposed project, the Modified I-15 Alternative would require site excavation, grading, road construction, and installation of heliostats, any of which could disturb and result in impacts to resources. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the construction would involve the same type and amount of equipment, and the same procedures used in ground disturbance activities. Because the acreage associated with Ivanpah Unit 3 would be reduced from that in the proposed project by 433 acres (approximately 12.5 percent), the potential impacts associated with construction of the Modified I-15 Alternative would be reduced.

The specific resources that could be impacted in the revised Ivanpah Unit 3 location have not been inventoried, and impacts cannot be fully evaluated at this time. The revised Ivanpah Unit 3 location is directly adjacent to Interstate 15 and Ivanpah Unit 1, and very close to the Primm Valley Golf Course, all areas that have undergone extensive development and/or prior inventories for paleontological resources. Therefore, while unidentified resources are likely to be present, they are likely to be of the same type as those identified in those adjacent areas. Based on this, the mitigation measures required for the proposed project would be expected to be effective in avoiding and/or mitigating impacts to resources within the revised Ivanpah Unit 3.

Operations Impacts

For the proposed project, geologic conditions, including the potential for seismicity, subsidence, and landslides, would present potential impacts to the operation of the proposed project, but these would be mitigated through facility design and compliance with building codes. Because the location of the Modified I-15 Alternative and the proposed project would be approximately the same, potential threats to the facility caused by seismicity, subsidence, and landslides would be identical.

The proposed project would remove the entire project acreage from potential development of leasable sand and gravel resources. However, due to the large magnitude of these resources in the local area, this removal was not expected to cause an adverse impact to leasable mineral resources. The Modified I-15 Alternative would leave the original location of Ivanpah Unit 3 in the proposed project available to mineral development, which could include leasable sand and gravel operations. However, an equivalent acreage of potential mineral resources would be removed from potential development in the revised Ivanpah Unit 3 location.

There would be no potential impacts of the proposed project on existing locatable minerals claims on Limestone Hill (Numbers CAMC234026 and CAMC237293). In the Modified I-15 Alternative, Ivanpah Unit 3 would be located further away from Limestone Hill, and would therefore present even less of a potential disruption to development of those minerals claims.

Closure/Decommissioning Impacts

Closure and decommissioning impacts on geologic, paleontologic, and mineral resources would be associated with site disturbance activities, and would be the same as that described for construction activities. Due to the reduced acreage of disturbance associated with the Modified I-15 Alternative, potential impacts would be lower than those associated with the proposed project.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with geology, paleontology, and minerals.

4.16.2.4 No Action

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multirole use and sustained yield, and the maintenance of environmental quality [43 USC 1781 (b)] in conformance with applicable statures, regulations, policy, and land use plan.

The results of the No Action Alternative would be the following:

- The Impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and could include consideration of another solar project.

- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.
- The No Action Alternative would leave the proposed project area undisturbed and would therefore have no affect on existing geologic or paleontological resources in the area other than to maintain their availability for potential future development.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State /Federal mandates..

4.16.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

The mitigation measures allow BLM's Authorized Officer, the CPM, and the applicant to adopt a compliance monitoring scheme ensuring compliance with applicable laws and regulations for geologic hazards and geologic, mineralogical, and paleontological resources.

4.16.4 Mitigation Measures

The proposed ISEGS is situated in an active geologic environment. Strong ground shaking potential must be mitigated through foundation and structural design as required by the CBC (2007). Settlement due to compressible soils, groundwater withdrawal, hydrocompaction, or dynamic compaction, as well as potential impacts due to expansive soils and possible liquefaction, must be mitigated in accordance with a design-level geotechnical investigation as required by the CBC (2007), mitigation measure **GEO-1**, as well as the Energy Commission Conditions of Certification **GEN-1**, **GEN-5**, and CIVIL-1 in **Appendix C – Facility Design**.

Paleontological resources have been documented in the general area of the project and in sediments similar to those that are present near the site. The potential impacts to paleontological resources due to construction activities will be mitigated as required by mitigation measures **PAL-1** to **PAL-7**.

GEO-1 The Soils Engineering Report required by Section 1802A of the 2007 CBC should specifically include laboratory test data, associated geotechnical engineering analyses, and a thorough discussion of the potential for liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the presence of expansive clay soils. The report should also include recommendations for ground improvement and/or foundation systems necessary to mitigate these potential geologic hazards, if present.

Verification: The project owner shall include in the application for a grading permit a copy of the Soils Engineering Report which addresses the potential for liquefaction; settlement due to compressible soils, groundwater withdrawal, hydrocompaction, or dynamic compaction; and the possible presence of expansive clay soils, and a summary of how the results of the analyses were incorporated into the project foundation and grading plan design for review and comment by the CBO. A copy of the Soils Engineering Report, application for grading permit and any comments by the CBO are to be provided to BLM's Authorized Officer and the CPM at least 30 days prior to grading.

PAL-1 The project owner shall provide BLM's Authorized Officer and the CPM with the resume and qualifications of its PRS for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the Paleontological Resources Report, the project owner shall obtain BLM's Authorized Officer and CPM approval of the replacement PRS. The project owner shall keep resumes on file for qualified Paleontological Resource Monitors (PRMs). If a PRM is replaced, the resume of the replacement PRM shall also be provided to BLM's Authorized Officer and the CPM.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of BLM's Authorized Officer and the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by BLM's Authorized Officer and the CPM, the PRS shall meet the minimum qualifications for a vertebrate paleontologist as described in the SVP guidelines of 1995. The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;
2. Ability to recognize and collect fossils in the field;
3. Local geological and biostratigraphic expertise;
4. Proficiency in identifying vertebrate and invertebrate fossils; and
5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. PRMs shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

Verification:

1. At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work.
2. At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated monitors for the project, stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to BLM's Authorized Officer and the CPM. The letter shall be provided to BLM's Authorized Officer and the CPM no later than one week prior to the monitor's beginning on-site duties.
3. Prior to the termination or release of a PRS, the project owner shall submit the resume of the proposed new PRS to BLM's Authorized Officer and the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS, BLM's Authorized Officer, and the CPM for approval, maps and drawings showing the footprint of the power plants, construction lay down areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS, BLM's Authorized Officer, and the CPM. The site grading plan and plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings should show the location, depth, and extent of all ground disturbances and be at a scale of 1 inch = 40 feet to 1 inch = 100 feet range. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS, BLM's Authorized Officer, and the CPM.

If construction of the ISEGS project proceeds in phases, maps and drawings may be submitted prior to the start of each power plant. A letter identifying the proposed schedule of each project power plant shall be provided to the PRS, BLM's Authorized Officer and the CPM. Before work commences on affected power plants, the project owner shall notify the PRS, BLM's Authorized Officer and the CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week, and until ground disturbance is completed.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS, BLM's Authorized Officer, and the CPM.
2. If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS, BLM's Authorized Officer, and the CPM at least 15 days prior to the start of ground disturbance.

3. If there are changes to the scheduling of the construction phases of each power plant, the project owner shall submit a letter to BLM's Authorized Officer and the CPM within 5 days of identifying the changes.

PAL-3 If after review of the plans provided pursuant to **PAL-2**, the PRS determines that materials with moderate, high, or unknown paleontological sensitivity could be impacted, the project owner shall ensure that the PRS prepares, and the project owner submits to BLM's Authorized Officer and the CPM for review and approval, a paleontological resources monitoring and mitigation plan (PRMMP) to identify general and specific measures to minimize potential impacts to paleontological resources. Approval of the PRMMP by BLM's Authorized Officer and the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities, and may be modified with BLM's Authorized Officer and CPM approval. This document shall be used as the basis of discussion when on-site decisions or changes are proposed. Copies of the PRMMP shall reside with the PRS, each monitor, the project owner's on-site manager, BLM's Authorized Officer, and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP 1995) and shall include, but not be limited, to the following:

1. Assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;
2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the mitigation measures;
3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;
4. An explanation of why, how, and how much sampling is expected to take place and in what units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;
5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling;
6. A discussion of procedures to be followed in the event of a fossil discovery, halting construction, resuming construction, and how notifications will be performed;

7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;
8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meet the Society of Vertebrate Paleontology's standards and requirements for the curation of paleontological resources;
9. Identification of the institution that has agreed to receive data and fossil materials collected, requirements or specifications for materials delivered for curation, and how they will be met, and the name and phone number of the contact person at the institution; and
10. A copy of the paleontological mitigation measures.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to BLM's Authorized Officer and the CPM. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 If after review of the plans provided pursuant to **PAL-2**, the PRS determines that materials with moderate, high, or unknown paleontological sensitivity could be impacted then, prior to ground disturbance and for the duration of construction activities involving ground disturbance, the project owner and the PRS shall prepare and conduct weekly BLM Authorized Officer and CPM-approved training for the following workers: project managers, construction supervisors, foremen and general workers involved with or who operate ground-disturbing equipment or tools. Workers shall not excavate in sensitive units prior to receiving BLM Authorized Officer and CPM-approved worker training. Worker training shall consist of an initial in-person PRS training during the project kick-off, for those mentioned above. Following initial training, a BLM Authorized Officer and CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. No ground disturbance shall occur prior to BLM's Authorized Officer and the CPM approval of the WEAP, unless specifically approved by the BLM Authorized Officer and the CPM.

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources.

The training shall include:

1. A discussion of applicable laws and penalties under the law;
2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontological sensitivity;

3. Information that the PRS or PRM has the authority to halt or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;
4. Instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;
5. An informational brochure that identifies reporting procedures in the event of a discovery;
6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training; and
7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

Verification:

1. At least 30 days prior to ground disturbance, the project owner shall submit the proposed WEAP, including the brochure, with the set of reporting procedures for workers to follow.
2. At least 30 days prior to ground disturbance, the project owner shall submit the script and final video to BLM's Authorized Officer and the CPM for approval if the project owner is planning to use a video for interim training.
3. If the owner requests an alternate paleontological trainer, the resume and qualifications of the trainer shall be submitted to BLM's Authorized Officer and the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct training prior to BLM's Authorized Officer and the CPM authorization.
4. In the monthly compliance report (MCR, the project owner shall provide copies of the WEAP certification of completion forms with the names of those trained and the trainer or type of training (in-person or video) offered that month. The MCR shall also include a running total of all persons who have completed the training to date.

PAL-5 The project owner shall ensure that the PRS and PRM(s) monitor consistent with the PRMMP all construction-related grading, excavation, trenching, and augering in areas where potential fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full-time monitoring is not necessary in locations that were identified as potentially fossil-bearing in the PRMMP, the project owner shall notify and seek the concurrence of BLM's Authorized Officer and the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to halt or redirect construction if paleontological resources are encountered. The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring from the accepted schedule in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to BLM's Authorized Officer and the CPM prior to the change in monitoring and will be included in the monthly compliance report. The letter or email shall include the justification for the change in monitoring and be submitted to BLM's Authorized Officer and the CPM for review and approval.
2. The project owner shall ensure that the PRM(s) keep a daily monitoring log of paleontological resource activities. The PRS may informally discuss paleontological resource monitoring and mitigation activities with BLM's Authorized Officer and the CPM at any time.
3. The project owner shall ensure that the PRS notifies BLM's Authorized Officer and the CPM within 24 hours of the occurrence of any incidents of non-compliance with any paleontological resources mitigation measures. The PRS shall recommend corrective action to resolve the issues or achieve compliance with the mitigation measures.
4. For any paleontological resources encountered, either the project owner or the PRS shall notify BLM's Authorized Officer and the CPM within 24 hours, or Monday morning in the case of a weekend event where construction has been halted because of a paleontological find.

The project owner shall ensure that the PRS prepares a summary of monitoring and other paleontological activities placed in the monthly compliance reports. The summary will include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities, and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits encountered, descriptions of samplings within each unit, and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontological resource monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by BLM's Authorized Officer and the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, BLM's Authorized Officer and the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after project completion and approval of BLM Authorized Officer and CPM-approved paleontological resource report (see **PAL-7**). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to BLM's Authorized Officer and the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and submit it to the BLM Authorized Officer and the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to BLM's Authorized Officer and the CPM.

Certification of Completion
Worker Environmental Awareness Program
ISEGS (07-AFC-5)

This is to certify these individuals have completed a mandatory California Energy Commission-approved WEAP. The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

No.	Employee Name	Title/Company	Signature
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Cultural Trainer: ______________ Signature:___________________ Date: ___/___/___

PaleoTrainer: ________________ Signature:____________________ Date: ___/___/___

Biological Trainer: _____________ Signature: ____________________Date:___/___/____

4.16.5 Summary

The proposed ISEGS site is located in a moderately active geologic area on the west side of Ivanpah Valley, east of the Clark Mountain Range in the eastern Mojave Desert of Southern California. The main geologic hazards at this site include ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the presence of expansive clay soils. The applicant would comply with state requirements regarding facility design by incorporating recommendations contained in a design-level geotechnical report as required by the California Building Code (2007). In addition, the applicant would comply with Energy Commission Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** (provided in **Appendix C - Facility Design**), which were recommended by Energy Commission staff in their FSA to eliminate or reduce the magnitude of these potential impacts. The design and construction of the project should have no adverse impact with respect to geologic, mineralogical, and paleontological resources.

The proposed project area is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals. Sand and gravel resources are present at the site and could potentially be a source of salable resources; however, such materials are present throughout the regional area such that the ISEGS should not have an adverse impact on the availability of such resources.

Paleontological resources have been documented within 45 miles of the project, but no fossils were found during field explorations on the solar plant sites or near the substation and ancillary facilities; however, pack rat middens with plant remains were found in the carbonate bedrock outcrop west of Ivanpah 3. If encountered, potential impacts to paleontological resources contained in these materials due to construction activities would be mitigated through worker training and monitoring by qualified paleontologists, as outlined in mitigation measures **PAL-1** through **PAL-7**.

Overall, the paleontological resource impacts associated with the Mitigated Ivanpah 3 Alternative would be lower than those associated with the proposed project due to the reduced acreage that would be disturbed during construction. Although the acreage would be reduced by approximately 12.5 percent, the potentially impacted area would be reduced by more than 12.5 percent, because the 433-acre area eliminated from the alternative would require extensive grading in the proposed project. Impacts on leasable and locatable mineral resources would be the same or lower for the Mitigated Ivanpah 3 Alternative than the proposed project. No hazards to either the proposed project or Mitigated Ivanpah 3 Alternative from geologic conditions would be expected.

The paleontological resource impacts associated with the Modified I-15 Alternative would also be lower than those associated with the proposed project due to the reduced acreage that would be disturbed during construction. Although the resources within the revised Ivanpah Unit 3 location have not been inventoried, they are likely to be similar to those identified and evaluated for the proposed project. Impacts on leasable and locatable mineral resources would be the same or lower for the Modified I-15 Alternative than the proposed project. No hazards to either the proposed project or Modified I-15 Alternative from geologic conditions would be expected.

Table 4.16-4
Comparison of Geology, Paleontology, and Minerals Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Paleontological resources	Construction could impact resources. Impact would be mitigated.	Lower than proposed project, higher than No Action. Impact would be mitigated.	Lower than proposed project, higher than No Action. Impact would be mitigated.	No potential impact
Leasable mineral resources	Sand and gravel resources would be removed from potential production. No impact expected.	Lower than proposed project, higher than No Action. No impact expected.	Lower than proposed project, higher than No Action. No impact expected.	No potential impact
Locatable mineral resources	Project adjacent to locatable claims, but no impact expected.	Project proximity to locatable claims the same as proposed project, but no impact expected.	Project proximity to locatable claims is further than in the proposed project, no impact expected.	No potential impact
Geologic hazards (seismicity, subsidence, landslides)	Minimized through facility design and compliance with building codes.	Same as proposed project. Minimized through facility design and compliance with building codes.	Same as proposed project. Minimized through facility design and compliance with building codes.	No potential impact

4.17 Livestock Grazing

Introduction

The purpose of the analysis in this section is to determine if the proposed ISEGS could potentially cause adverse impacts to livestock grazing and grazing administration. Livestock grazing has been and continues to be a use of renewable resources on public land in the California Desert. The Taylor Grazing Act of 1934, Federal Land Policy and Management Act of 1976 and the Public Rangelands Improvement Act of 1978 (P.L. 95-514) recognize livestock grazing as a principal use of public land for the production of food and fibers. This section evaluates whether the proposed project and alternatives would comply with applicable laws and regulations pertaining to land use for grazing purposes. It also evaluates the scope of the potential impacts with respect to the definitions of significance provided in NEPA implementing regulations found in 40 CFR 1508.27.

Resource-Specific Project Description

The ISEGS project area comprising Ivanpah 1, 2 and 3, located entirely within the Clark Mountain Allotment, would be completely fenced to exclude livestock. Livestock would no longer have access to graze the forage from plant communities associated with the site. Approval of the project would require a modification of the grazing lease, by reducing the total active AUMs as calculated from past range adjudication methods.

Applicable Laws, Regulations, and Supplemental Authorities

The following federal, state, and local laws and policies apply to the administration of livestock grazing. BLM's analysis examines the project's compliance with these requirements.

Table 4.17-1
Applicable Laws, Regulations, and Supplemental Authorities

Potentially Applicable Law	Description
Federal	
Taylor Grazing Act of June 28, 1934	Congress passed the Taylor Grazing Act in 1934 to direct occupancy and use of public rangelands, to preserve natural resources from destruction or unnecessary injury, provide for the orderly use, improvement, and development of rangelands.
Federal Land Policy and Management Act	Section 202 of FLPMA requires BLM to develop and maintain land use plans for public lands, which in turn identify lands that are available for the issuance of permits or leases for grazing.
Public Rangelands Improvement Act	Defines rangeland, establishes a national policy to improve the condition of rangelands, requires a national inventory of rangelands, and authorizes funding for range improvement projects.
43 CFR Section 4100	Regulations under which BLM administers its grazing program.
California Desert Conservation Area Plan	Defines Multiple-Use Classes for BLM-managed lands in the CDCA, which includes the land area encompassing the proposed project location.

Potentially Applicable Law	Description
Northern and Eastern Mojave Desert Management Plan	An amendment to the CDCA Management Plan, the NEMO Plan establishes standards and guidelines for grazing activities in the NEMO Planning Area.

4.17.1 Affected Environment

Under the CDCA Plan, 4.5 million acres (36 percent of public lands in the CDCA) in 54 grazing allotments are available for grazing, of which the Clark Mountain Allotment is one. The CDCA Plan prescribes the area and the sustainable amount of forage in animal unit months (AUMs) for each allotment. An AUM is a measure of forage that sustains one cow/calf pair for one month. Allotments with perennial forage have an established limit of forage based on the quality and quantity of perennial plants and are permitted in AUMs for a defined period of grazing use. Perennial forage use is typically authorized to be consumed at the same level from year to year unless forage production does not meet seasonal norms.

BLM Clark Mountain Allotment Grazing Lease

The ISEGS site is located within the existing BLM Clark Mountain Allotment Grazing Lease, which is a perennial/ephemeral allotment (Allotment #09003). The allotment contains 97,560-acres of public lands. The approximate 4,073-acre ISEGS site boundary is approximately 4 percent of the area of the allotment.

Pursuant to 43 CFR 4100, Section 4110.4-2 (b) when grazed public lands within allotments, or smaller portions , are disposed of or devoted to a public purpose other than livestock grazing, adjustments to the grazing lease's active use AUMs are made to reflect the loss of available livestock forage from that area. The lessee shall be given two years prior notification before their grazing lease is modified and this time is to remove any range improvements that may be within the project footprint and for the livestock producer to make livestock management adjustments. Should the proposed project be approved, BLM would issue a decision to modify allotment boundaries and reduce the grazing permitted use as part of the ISEGS Record of Decision.

4.17.2 Environmental Consequences

Methodology

Because the solar project would be located on federal land, California state regulations which protect and manage farmlands, including livestock grazing, are not applicable to the proposed project area. Under NEPA, the impact of the proposed project and alternatives on the Clark Mountain Allotment would be considered adverse impacts if they would involve changes in the existing environment which, due to their nature or location, could result in a substantial reduction in foraging opportunities to plant communities on the ISEGS site or to the safety of livestock.

Impacts to livestock grazing are mostly associated with the occupation of the land area by the facility, and separation of impacts into construction, operations, and closure and decommissioning components is not applicable. Therefore, these components are combined for the following analysis.

4.17.2.1 Proposed Project

The vegetation communities within the 3,712 acre project site produce small amounts of livestock forage relative to more productive plant communities found on higher elevation areas elsewhere within the allotment. These higher elevations produce the majority of the forage. Below 3,500 feet in elevation, forage production is better described as ephemeral rangeland. Ephemeral rangelands means the Hot Desert Biome regions that do not consistently produce enough forage to sustain a livestock operation but may briefly produce unusual volumes of forage to accommodate livestock grazing.

This proposed project would cause a 70 AUM reduction to grazing preference on the Clark Mountain Allotment that has been grazed for many years and is expected to continue at the reduced level. Because the number of AUMs on the lease would be reduced, the proposed project would not result in increasing the amount of grazing that would occur in the remainder of the lease.

When livestock are present on the allotment, it is anticipated that they will not visit areas immediately around the project site for two reasons related to the availability of water: 1) there are no water sources in the immediate vicinity of the project; and 2) there are other locations within the allotment that offer more desirable forage and water to support livestock grazing.

This proposed project would result in minor impacts to the livestock operator, his livestock, and the quality of the remainder of the allotment as wildlife habitat, recreational use, or other multiple uses. The geographic scope of the impact would include three power plants comprising a relatively small amount (4%) of the Clark Mountain Allotment. The impact would not affect public health or safety, and would not impact land with unique characteristics.

Upon project closure and decommissioning, the land that comprises the project footprint would be rehabilitated to reestablish plant communities originally occurring on the site before the original grant was issued. Following the achievement of the objectives for rehabilitation, as outlined in the rehabilitation plan, the ROW grant would then be cancelled adding 3,712 acres of reclaimed land back to the land base of Clark Mountain Allotment. Any AUMs suspended during the life of this project would be removed from suspension, increasing total Active Use AUMs of the current grazing lease for the allotment.

Should relinquishment of the grazing lease for Clark Mountain Allotment and reallocation of forage to wildlife purposes occur in accordance with NEMO, then the land would be managed in the same way as the surrounding non-withdrawn areas.

Beneficial Impacts

Approval of this proposed project would not have any impacts on grazing which could be considered to provide a public benefit. The proposed project would not increase the availability or quality of grazing lands in other locations, nor would it mitigate environmental impacts to grazing lands in other areas.

4.17.2.2 Mitigated Ivanpah 3 Alternative

The livestock grazing impacts resulting from the Mitigated Ivanpah 3 Alternative would be similar to those associated with the proposed project. This would include removal of approximately 3,564 acres from the existing Clark Mountain Grazing Lease. Because this is a reduction of 433 acres from the proposed project, the adverse impact of the Mitigated Ivanpah 3 Alternative on the grazing lease would be reduced from that associated with the proposed project. By reducing the project footprint by approximately 12.5 percent, the Mitigated Ivanpah 3 Alternative would require a reduction of approximately 62 AUMs in the allotment.

Other potential impacts to the grazing lease could occur due to the use of vehicles and equipment in active grazing areas. During construction, potential risks to cattle from these vehicles would be mitigated by speed limits and informing site workers of the potential hazards. Once the site fence is constructed, these potential threats during operations and decommissioning would be reduced, and would be limited to infrequent monitoring and maintenance on the outside of the fence. Potential impacts from these sources would be the same for the Mitigated Ivanpah 3 Alternative and the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with livestock grazing.

4.17.2.3 Modified I-15 Alternative

The livestock grazing impacts resulting from the Modified I-15 Alternative would be similar to those associated with the proposed project. This would include removal of approximately 3,564 acres from the existing Clark Mountain Grazing Lease. Because this is a reduction of 433 acres from the proposed project, the adverse impact of the Modified I-15 Alternative on the grazing lease would be reduced from that associated with the proposed project. By reducing the project footprint by approximately 12.5 percent, the Modified I-15 Alternative would require a reduction of approximately 62 AUMs in the allotment. The reconfigured location of the Ivanpah Unit 3 footprint is not expected to cause any difference in the impacts to the allotment.

Other potential impacts to the grazing lease could occur due to the use of vehicles and equipment in active grazing areas. During construction, potential risks to cattle from these vehicles would be mitigated by speed limits and informing site workers of the potential hazards. Once the site fence is constructed, these potential threats during operations and decommissioning would be reduced, and would be limited to infrequent monitoring and maintenance on the outside of the fence. Potential impacts from these sources would be the same for the Modified I-15 Alternative and the proposed project.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with livestock grazing.

4.17.2.4 No Action

The No Action alternative would leave the land area under existing management, and therefore available for grazing use. Livestock grazing would continue to be managed and authorized under the appropriate management plans, regulations, and other policies.

4.17.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

In general, the Federal laws and regulations related to grazing have to do with the classification of land suitability for grazing, establishment of administrative requirements for the leasing of grazing on public lands, and standards to be followed by lessees in order to protect the environment. Although the land of the proposed project is currently part of an allotment, administrative means for modifying the acreage within an allotment are available. Therefore, approval of the proposed project would comply with the applicable federal regulations and laws.

The state laws and regulations associated with the California Department of Conservation and the Williamson Act are not applicable to the proposed project, because federal lands are not subject to state classification or contract. Therefore, approval of the proposed project would comply with applicable state regulations and laws.

4.17.4 Mitigation Measures

This project would pose no adverse risk to grazing livestock if mitigation measures are implemented. Speed limits of 10 miles per hour (mph) on unpaved roads and 25 mph on stabilized roads imposed for fugitive dust control as would be required under mitigation measures **AC-SC3** and **AQ-SC7** are expected to be effective in also protecting grazing livestock from vehicle strike. Fencing of project construction areas and of permanent facilities used during operations would also be required as a component of the Construction and Operation Site Security Plans as would be specified under mitigation measures **HAZ-4** and **HAZ-5** respectively. The speed limit and fencing mitigation measures that would apply during construction and operation on the project site would minimize hazards to cattle when they roam the allotment in search of forage, and thus the project would not be likely to result in direct, adverse impacts.

4.17.5 Summary

The issue of cattle grazing and grazing administration is directly applicable to the proposed project because the public lands associated with the proposed project are within an active grazing allotment. Because the proposed project would involve removal of vegetation and fencing off of the entire property, approval of the proposed project would require modifying the allotment boundaries, resulting in a minor reduction in allotment size of 4 percent. Administratively, this modification can be accomplished through BLM administrative procedures. In addition, increased traffic associated with construction and operation of the proposed project are not expected to cause injury of death to individual cattle through vehicle strikes because the livestock may well avoid the area in its entirety because of the human activities that would occur on the site. The impact would result in modification of the allotment boundaries, resulting in a minor 4 percent reduction in allotment acreage which is not considered a substantial adverse impact to foraging opportunities or to the safety of livestock.

The No Action Alternative would not have any impact on the characteristics or administration of the allotment.

The impact of the Mitigated Ivanpah 3 and Modified I-15 Alternatives on the existing Clark Mountain Grazing Lease would be direct and adverse, but would be lower than that associated with the proposed project. Any hazards associated with vehicle and equipment use in active cattle grazing areas when cattle are present would be the same for both alternatives, and would be mitigated through the use of speed limits and worker notifications.

Table 4.17-2
Comparison of Livestock Grazing Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Clark Mountain Grazing Lease	Direct adverse impact from removal of 4,073 acres and 70 AUMs from the lease	Direct adverse impact from removal of 3,564 acres and 62 AUMs from the lease	Direct adverse impact from removal of 3,564 acres and 62 AUMs from the lease	No potential impact
Vehicle impacts to individual cattle	Potential impact low, and would be mitigated	Potential impact the same as proposed project, and would be mitigated	Potential impact the same as proposed project, and would be mitigated	No potential impact
Cumulative impacts to land available for grazing	Incremental contribution to long-term land available for grazing	Lower than proposed project, higher than No Action.	Lower than proposed project, higher than No Action.	No potential impact

4.18 Wild Horses and Burros

Introduction

The purpose of the analysis in this section is to determine if the proposed ISEGS could potentially cause adverse impacts to wild horses or burros. This section provides BLM's analysis of the impact of the proposed project and alternatives on wild horses and burros. Wild horses and burros are protected by the Wild and Free-Roaming Horse and Burro Act of 1971 (P.L. 92-195), as amended by the FLPMA and the Public Rangelands Improvement Act of 1978 (P.L. 95-514), that declares these animals an integral part of the public land resources. Through the Act, Congress declared that: "It is the policy of Congress that wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands" and are to be managed "in a thriving natural ecological balance." Proper management is required to achieve and maintain population levels to ensure healthy herds and animals and to maintain a thriving natural ecological balance through reduction or eliminating of conflicts now creating severe adverse impacts on other highly valued natural resources, especially wildlife. BLM regulations pertaining to wild horses and burros are specified in 43 CFR Part 4700, and the 4700 BLM Manual Series prescribes the authorities, objectives, and policies that guide the protection, management, control, and disposition of wild horses and burros.

The CDCA Plan included a Wild Horse and Burro Element which contained the following goals:

- provide year-long food requirements of wild horses and burros;
- provide adequate cover for wild horses and burros;
- provide adequate living space for wild horses and burros; and
- protect wild horses and burros on public lands.

The CDCA Plan established 17 Herd Management Areas (HMAs) where populations of wild horses and burros would be managed and protected. Components of some of the HMAs, including boundaries and Appropriate Management Levels (AMLs) were revised through the NEMO Plan amendments to the CDCA Plan.

Resource-Specific Project Description

The ISEGS project area comprising Ivanpah 1, 2 and 3 would be completely fenced, eliminating access to the site for burros. Burros would no longer have access to graze the forage from plant communities associated with the site.

Applicable Laws, Regulations, and Supplemental Authorities

The following federal laws and policies apply to the administration of wild horses and burros. BLM's analysis examines the project's compliance with these requirements.

Table 4.18-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law	Description
Federal	
Wild and Free-Roaming Horse and Burro Act (1971)	Requires the inventorying of populations to establish AMLs, and defines procedures to be used for the management and adoption of individuals in order to maintain AMLs. Prohibits harassment or injury to individuals.
Federal Land Policy and Management Act	Modifies the Wild and Free-Roaming Horse and Burro Act to allow the use of helicopters in herd management.
Public Rangelands Improvement Act	Modifies the Wild and Free-Roaming Horse and Burros Act by defining "excess animals", and by modifying inventory procedures and adoption standards.
California Desert Conservation Area Management Plan	Establishes 17 HMAs, including the Clark Mountain HMA in the proposed project area.
Northern and Eastern Mojave Desert Management Plan	The NEMO Plan amends the CDCA Plan by reducing the AML for burros in this area from 44 to 0.

4.18.1 Affected Environment

Wild burros inhabiting the United States are descendents of the Nubian and Somali wild ass (*Equus asinus*) of northeastern Africa. The burro was domesticated over 5,000 years ago in Africa and used as a beast of burden. Spanish explorers introduced the burro as a domesticated animal to North America in the 16th century. Wild burro populations became established in the arid southwest as a result of domestic escapees and from burros being intentionally turned loose when they were no longer needed.

The CDCA Plan established 17 HMAs, including the Clark Mountain HMA, which includes the proposed project location. The Clark Mountain HMA, which encompasses 233,407 acres in the northern and eastern portions of the Clark Mountain Range, is managed by the BLM, and is covered under BLM's East Mojave Herd Management Area Plan. No wild horses have been documented in the Clark Mountain HMA, but burros have been observed near the proposed project location as recently as May 2010.

Historically, BLM management of this herd has included the removal of burros to maintain population levels at the established AML of 44 burros. There was a burro gather conducted in April 2001, where 79 burros were removed from the east side of Clark Mountain. The gathered burros were placed in the BLM's National Wild Horse and Burro Adoption Program.

A component of the NEMO Plan Amendment is the reduction of the AML for burros in this area of the HMA from 44 to 0. The purpose of this amendment was to reduce grazing and therefore assist the recovery of desert tortoise. In implementation of the NEMO Plan Amendment, nearly 100 burros were removed by BLM in January 2007. Burros are still known to exist in this area, with burros observed a few miles to the west in Wheaton Wash in May 2010. Although BLM plans to remove the remaining burros, the remaining burros are still protected by the provisions of the Wild and Free-Roaming Horses and Burros Act.

4.18.2 Environmental Consequences

Methodology

The impact of the proposed project and alternatives on wild horses and burros would be considered an adverse impacts if they would involve changes in the existing environment which, due to their nature or location, could result in interference with BLM's management of HMAs. Impacts to wild horses and burros are mostly associated with the occupation of the land area by the facility, and separation of impacts into construction, operations, and closure and decommissioning components is not applicable. Therefore, these components are combined for the following analysis.

4.18.2.1 Proposed Project

The proposed project location is included within the Clark Mountain HMA, which has historically been managed to protect burro populations. No wild horses have been documented in the Clark Mountain HMA. Although burros are still know to be present in the area, the AML for burros in this area of the HMA was reduced from 44 to 0 through the NEMO Plan Amendment, and BLM implemented burro removal in 2007. All remaining burros are expected to be removed.

The proposed project would include the removal of vegetation and installation of fencing of the entire 3,712-acre project area comprising those facilities that would cause permanent disturbance including Ivanpah 1, 2 and 3 power plants, Ivanpah substation, the administration area and some features of linear facilities. The proposed project would make the project area inaccessible for grazing of individual burros.

Construction and operation of the proposed project is expected to involve increased traffic use of the existing roads from the Yates Well Road exit on Interstate 15 to the proposed project location. Increased traffic levels could impact burros by causing vehicle strikes. Additionally, burros could be injured or killed by falling into trenches or stormwater management systems during construction of the proposed project. Following construction, fencing is expected to keep burros outside of the proposed project location.

With respect to NEPA, the proposed project would have a direct, adverse impact on 3,712 acres of land area that is currently used for grazing by existing burro populations. Because the AML for burros in the HMA is zero, and BLM has been actively removing burros from the HMA, the impact of the proposed project on burros would not be considered to be adverse. The impact on the existing burros would not affect public health or safety, would not impact land with unique characteristics (such as HMAs), and is not likely to have uncertain risks associated with it.

Upon project closure and decommissioning, the land that comprises the project footprint would be rehabilitated to reestablish plant communities originally occurring on the site before the original grant was issued. Following the achievement of the objectives for rehabilitation, as outlined in the rehabilitation plan, the ROW grant would then be cancelled adding 3,712 acres of reclaimed land back to the land base of Clark Mountain Allotment and the HMA that may very well be free of burros.

Beneficial Impacts

Approval of the proposed project would not have any effects on burros which could be considered to provide a public benefit. The loss of marginal quality forage base associated with the project footprint should not impact burros as other areas within Clark Mountain Allotment provide more abundant and better quality forage for burros when in the Clark Mountain HMA. Full performance from the project may not be realized until after burros have been removed in accordance with the NEMO Plan Amendment.

4.18.2.2 Mitigated Ivanpah 3 Alternative

Because wild horses are not present in the project area, and BLM has established the AML for burros in the Clark Mountain HMA at zero, the fencing of the land area associated with either the proposed project or the Mitigated Ivanpah 3 Alternative would have no impact on wild horses and burros

Similar to grazing, potential impacts to individual burros could occur due to the use of vehicles and equipment when burros are present. During construction, potential risks to burros from these vehicles would be mitigated by speed limits and informing site workers of the potential hazards. Once the site fence is constructed, these potential threats during operations and decommissioning would be reduced, and would be limited to infrequent monitoring and maintenance on the outside of the fence. Potential impacts to individual burros from these sources would be the same for the Mitigated Ivanpah 3 Alternative and the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with wild horses and burros.

4.18.2.3 Modified I-15 Alternative

Because wild horses are not present in the project area, and BLM has established the AML for burros in the Clark Mountain HMA at zero, the fencing of the land area associated with either the proposed project or the Modified I-15 Alternative would have no impact on wild horses and burros

Similar to grazing, potential impacts to individual burros could occur due to the use of vehicles and equipment when burros are present. During construction, potential risks to burros from these vehicles would be mitigated by speed limits and informing site workers of the potential hazards. Once the site fence is constructed, these potential threats during operations and decommissioning would be reduced, and would be limited to infrequent monitoring and maintenance on the outside of the fence. Potential impacts to individual burros from these sources would be the same for the Modified I-15 Alternative and the proposed project.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with wild horses and burros.

4.18.2.4 No Action

The No Action alternative would not affect BLM's current plans with respect to management of the remaining burros.

4.18.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

In general, the Federal laws and regulations related to grazing have to do with the establishment of HMAs, definition of the AMLs within each HMA, and the administrative procedures for removing excess animals. Because AML for the Clark Mountain HMA is zero, impacts of the proposed project on burros would not be out of compliance with any of the federal laws and regulations associated with wild horses and burros. Therefore, approval of the proposed project would comply with the grazing and rangeland components of these regulations and plans.

4.18.4 Mitigation Measures

This project would pose no direct risk to wild horses and burros, if mitigation measures are implemented. Prior to commencement of proposed project activity, project personnel shall be briefed regarding the potential presence of burros within the project area as would be included in the Worker Environmental Awareness Program specified in mitigation measure **BIO-6**. Speed limits of 10 mph on unpaved roads and 25 mph on stabilized roads established for fugitive dust control during construction and operations in accordance with mitigation measure **AC-SC3** and **AQ-SC7** are expected to be sufficient to reduce risk of injury or death to burros by vehicle strike. In order to protect burros against other construction-related injury, all project construction areas should be fenced to eliminate access by burros to any excavations developed during construction. Fencing is a component of the Construction and Operation Site Security Plans specified in mitigation measures **HAZ-4** and **HAZ-5** respectively. These conditions would also protect burros in portions of the project area where maintenance is taking place outside of fenced boundaries during project operations.

No additional mitigation measures are necessary to address protection of wild horses and burros.

4.18.5 Summary

The issue of burros is directly applicable to the proposed project because the public lands associated with the proposed project coincides with a designated HMA, and because burros are known to exist in the vicinity of the proposed project location. Because the proposed project would involve removal of vegetation and fencing of the entire 4,073 acre property that would be permanently disturbed, approval of the proposed project would eliminate a small portion of the land area available for the existing burros. In addition, increased traffic associated with construction and operation of the proposed project could potentially cause injury or death to individual burros through vehicle strikes. Individual burros could also be injured or killed if they were to fall into excavations associated with project construction activities, or be fed and watered by humans in the immediate vicinity of the project footprint.

The NEMO Plan Amendments have established the AML in the vicinity of the proposed project area at zero, meaning BLM is actively involved in removing all burros within the area. In addition, the mitigation measures would avoid injury to burros while they may still be present in the project area or vicinity.

The No Action Alternative would not have any impact on the characteristics or administration of the burros.

The proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative would not have an adverse impact on wild horses or burros in the project area. Any hazards to individual burros associated with vehicle and equipment use would be the same for all three alternatives, and would be mitigated through the use of speed limits and worker notifications.

Table 4.18-2
Comparison of Wild Horses and Burros Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Fencing of land area	No potential impact	No potential impact	No potential impact	No potential impact
Vehicle impacts to individual burros	No potential impact	No potential impact	No potential impact	No potential impact

4.19 Recreation

Introduction

The purpose of the analysis in this section is to analyze the possible effects the proposed action and alternatives would have on recreation resources and determine if those impacts could be adverse. Recreation has been and continues to be an important use of public land in the California Desert, including the Clark Mountain and Ivanpah Valley areas. The FLPMA recognizes recreation as a principal or major use of public land, and in its Declaration of Policy (Title I) states that it is the policy of the United States that the public lands be managed in a manner that will provide for outdoor recreation. Recreational uses of public lands may either be informal, casual uses which are managed by BLM through the land use planning process, or formally-approved uses managed through a BLM permitting process.

This section evaluates the proposed project and alternatives to determine if they would result in adverse impacts to recreation opportunities on public lands.

Resource-Specific Project Description

The ISEGS project area comprising Ivanpah 1, 2 and 3 would be completely fenced, eliminating access to the site for recreational use. The project boundary would overlap three existing open route designations; route 699226, route 699198, and a segment of Colosseum Road. Approximately 7,200 feet of route 699226 would be cut off by the Ivanpah 3 facility and another 6,500 feet of route 669198 would be cut off by the Ivanpah 2 facility. An estimated 5,000 feet of the Colosseum Road would also be cut off by the Ivanpah 2 facility. In addition, the visual character of the project area would be modified, as discussed in Section 4.13, and this modification may impact certain recreational uses of the area.

Applicable Laws, Regulations, and Supplemental Authorities

The following federal and state laws and policies apply to the administration of recreation. BLM's analysis examines the project's compliance with these requirements.

Table 4.19-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law	Description
Federal	
Federal Land Policy and Management Act	Recognizes that it is the policy of the United States that the public lands be managed in a manner which will provide for outdoor recreation.
California Desert Conservation Area Plan	Defines Multiple-Use Classes for BLM-managed lands in the CDCA, which includes the land area encompassing the proposed project location.
Northern and Eastern Mojave Desert Management Plan Amendment	The purpose of this amendment to the CDCA Plan was to evaluate land use changes necessary to protect threatened and endangered species. This included changes in permitted recreational uses and designated routes of travel.

Applicable Law	Description
State	
Warren-Alquist Act	§25529 requires that when a facility is proposed to be located in the coastal zone or any other area with recreational, scenic, or historic value, the commission will require, as a Condition of Certification that an area be established for public use.

4.19.1 Affected Environment

The Mojave Desert is a popular recreation destination, with people drawn to its open spaces, diverse landscapes, unique geography, and freedom from the restrictions of more urban areas. The desert provides resources that are necessary for a variety of recreational experiences. These resources include unique geography such as dry lakes and sand dunes, scenic values, solitude, and freedom from the structure and regulations of urban areas. In general, all recreational activities in the desert are dependent upon vehicle access to some degree, with visitors directed to travel on previously designated and marked motorized vehicle routes. Most public recreation use of BLM-administered lands is casual, and unsupervised. BLM management of some recreational activities occurs in relation to OHV events, permitted commercial and organized activities (bighorn sheep hunts, trail rides, and vision quests), and within specific local wildlife conservation sites. These activities are formally authorized through the Special Recreation Permit process.

A variety of recreational activities occur on public lands in the proposed project area. These include auto touring, backpacking, biking, camping, climbing, hiking, horseback riding, nature walks, star gazing, wilderness areas, and wildlife viewing. In addition, sightseers, painters, and photographers are drawn by spring wildflower displays, and year-round bird-watching. Clark Mountain, managed by the MNP located within a few miles to the west of the proposed project location provides rock climbing, hiking, hunting, and wildlife viewing.

The proposed project would be located within Ivanpah Valley, which comprises approximately 37,280 acres. A prominent feature of Ivanpah Valley is the Ivanpah Dry Lake, located less than two miles to the east, and down gradient, of the proposed project location. Due to the unique character of its extensive flat surface, the Ivanpah Dry Lake has been designated by BLM for non-motorized, open-space recreational activities, and BLM issues both Special Recreation Permits and casual use permits for recreational use of the Dry Lake for land sailing and kite buggy use. The Dry Lake is the location of National and International Land Sailing Regattas. Additionally, world speed trials in which land sailing speed records have been set occur on Ivanpah Dry Lake. The Dry Lake is also used for photography and film projects, for both recreational and commercial purposes. Additional recreational activities include long distance bow and arrow target shooting, hang gliding, and model rocket and airplane flying. BLM issues approximately 250 permits per year for recreational activities on the Dry Lake.

The area at the northern end of Ivanpah Dry Lake, where Interstate 15 (I-15) crosses the Nevada border, has undergone substantial development as a tourist destination. This development includes casinos and associated hotels and restaurants located 4.5

miles to the northeast of the proposed project location. The Primm Valley Golf Course is located within 0.5 miles of the proposed project location.

The property at the proposed project location is currently accessible to the public, on designated roads, used by recreationalists to access hiking, hunting, and/or viewing areas in the Clark Mountains, the Stateline, and Mesquite Wilderness, the Primm Valley Golf Course, the Primm Casinos, or the Ivanpah Valley and Playa. Roads within and adjacent to the proposed project site are used annually for the Los Angeles, Barstow to Las Vegas Dual Sport Motorcycle Tour.

4.19.2 Environmental Consequences

Methodology

BLM's evaluation of the impact of the proposed project on recreational resources includes an assessment of the following potential impacts:

- Fencing of the project area, eliminating direct usage of the area for recreation;
- Modification of the visual character of the area, affecting the quality of the experience for certain recreational users; and
- Modification of wind or surface characteristics on Ivanpah Playa, and thus affecting the quality of that surface in supporting land sailing and other recreational uses.

Each of these issues is associated with occupation of the land area, rather than direct construction or operational activities. Therefore, these components are combined for the following analysis.

4.19.2.1 Proposed Project

Recreational Resources within Proposed Project Boundaries

Approval of the proposed project would directly remove approximately 3,712 acres associated with ISEGS permanent disturbance from potential use for recreational opportunities such as camping, hiking, hunting, and wildlife viewing. This comprises approximately 10% of the land area available for recreation within the Ivanpah Valley, but is a small fraction of the overall land area available in the eastern Mojave Desert.

The proposed project would not have a direct impact on recreational resources within the proposed right-of-way grant boundaries, because it is unlikely that the proposed project area is substantially used for recreation except for providing traffic access to other locations. Any impacts on traffic access to these other areas would be mitigated by the re-direction of roads around the facility and realignment of Colosseum Road through the logistics area between Ivanpah 1 and 2. The re-direction of roads around the perimeter of each facility is addressed in the applicant's proposed action, as they require use of the perimeter routes to maintain security and desert tortoise fencing. The perimeter routes would be constructed, operated, and maintained by the applicant, and would be granted a use right of way. Collosseum Road would remain open for public travel where it is re-routed through the Construction Logistics Area. The closed portions of the three routes would be removed from the list of open routes on BLM's Off Highway Vehicle designation. The replacement routes would be part of the ROW grant for the project, and would remain open and maintained by the applicant for the life of the facility. The redirected routes and Collosseum Road would be designed and constructed to minimize damage to soil, watershed, vegetation, and air resources. These routes would be monitored by the applicant to avoid disruption to wildlife resources. Recreational use of the redirected trails would not conflict with facility operations, except on the rare occasion that repair equipment is mobilized by the applicant to repair damage to security or desert tortoise fencing around the solar project. Fence maintenance could temporarily block the route to other users; however, this impact would only occur on an occasional basis and would be a minor inconvenience. Recreational vehicles traveling on Colosseum Road may be temporarily inconvenienced by slow moving construction-related traffic during the construction phases of the project. Although the direct impacts to recreational users are expected to be minor, the development of the power generation plant would change the experience from that of a primitive driving experience to the experience of driving around a commercially developed urban area.

Regional Recreational Resources

The geographic scope of the impact would not be limited to the proposed land area of the project, but could potentially include the entire Ivanpah Valley from which the project site is visible. Recreational visitors in the Ivanpah Valley are attracted to the combination of desert scenery, close proximity to a major population center (Las Vegas), proximity to tourist destinations (Primm casinos and Primm Valley Golf Course), proximity to organized recreational events (the Los Angeles, Barstow-to-Vegas Dual Sport Event and land sailing events), designated wilderness (Clark Mountain, Stateline, Mesquite) and easy access by I-15.

The proposed project would have an indirect impact on recreational users in the region due to its diminishing of the quality of the outdoor setting. The project would transform the Ivanpah Valley area from a mostly natural setting to a more industrial setting. The sight of a large-scale solar power facility may attract some recreational users, so the impact would be beneficial to some users. However, recreationists interested in the outdoor experience of camping, hunting, and hiking would likely consider the proposed project to be adverse to their experience.

Recreationists to the region primarily come to experience one of the outstanding recreational experiences in the Ivanpah region, such as land sailing at Ivanpah Dry Lake, hiking and camping in nearby BLM wilderness, or rock climbing on Clark Mountain. While the outdoor setting will be diminished, this would not be likely to cause these recreationists to forgo the enjoyment of these recreational opportunities.

Scoping comments and public comments on the DEIS identified specific concerns with the potential affects to the Ivanpah Dry Lake, specifically the potential effects of a change in sedimentation and wind patterns. These concerns are specifically analyzed below.

Potential Impacts to Ivanpah Dry Lake

Recreational land sailing occurs at Ivanpah Dry Lake, and this lakebed is a regionally and globally important land sailing site where world speed records are established. The world record was most recently established on the Ivanpah Dry Lake in March, 2009, at 126.2 mph. The proposed project could have a direct impact on recreational use of Ivanpah Dry Lake for land sailing events if the construction or operation of the facility had any of the following effects:

- Modification of water flow and sedimentation rates onto the Dry Lake surface;
- Introduction of foreign materials (garbage, debris, or hazardous materials) to the Dry Lake surface;
- Modification of wind characteristics; or
- If the visual character of the facility were to present a distraction that could cause either a nuisance or a safety hazard to wind sailors.

Modified Sedimentation Characteristics

The Dry Lake surface is unique in not only being very flat, but also in having a hard surface that can support wheeled vehicles. The proposed project is located on the active alluvial fan between the mountains to the west which are a source of stormwater runoff and sediment, and the Dry Lake surface to the east which is the ultimate depositional destination of the stormwater flow and sediment. Construction of the 3,712-acre facility would potentially modify the existing hydrologic flow conditions that provide both water flow and sediment to the Dry Lake surface. Hydrologic flow modification could cause changes in the Dry Lake surface by a variety of methods, including promoting erosion of the surface, increasing or decreasing current sedimentation rates to the surface, or providing sediment of a different grain size and composition. To address this possibility, as well as to protect biological resources downstream of the facility, BLM has evaluated the effect of the proposed project development on stormwater runoff and sedimentation in Section 4.10. The analysis presented in that section concluded that proposed project would not modify stormwater flow or sedimentation characteristics downstream of the proposed facility. However, that section also noted that this conclusion is based on computer modeling assumptions that are approximate, and that there is little operational experience with developments of this magnitude in the Mojave Desert. To address this uncertainty, mitigation measure **Soil&Water-6** would specify stormwater monitoring and response measures to evaluate the effect of the proposed project on downstream runoff and sedimentation characteristics.

Introduction of Foreign Materials

In addition to modified stormwater and sediment, the proposed project could affect the Dry Lake surface if garbage, hazardous materials, or debris were to be released from the project area and move downstream during storm events. Management of garbage and hazardous materials on the proposed project property is addressed in Sections 4.5 and 4.14. Those sections concluded that the proposed management and disposal procedures for these materials would be adequate to protect against their release. The potential for debris is related to the potential for stormwater events to cause flood damage to project structures including heliostats, heliostat wiring, fencing, buildings, and stormwater management structures. The potential for these items to be damaged and transported during storm events was also evaluated in Section 4.10. Similar to the analysis of sedimentation, that analysis concluded that the proposed low-impact development method and evaluation of flood impacts on heliostats and other structures was likely to be adequate to avoid downstream transport of debris. In addition, mitigation measure **Soil&Water-5** would require the applicant to monitor the potential for stormwater damage to site structures, and would require a response should debris be transported downstream.

Modification of Wind Characteristics

Land sailing occurs throughout the year, with major racing events occurring in late March and other racing events occurring around Thanksgiving and at other times during the year (Hatch 2009). Most of the dry lake bed, on both sides of the I-15, is used for land sailing. In general, the most desirable wind speeds for land sailing are between 12 mph up to 30 mph; however, land sailing can occur during lower wind speeds down to 6 mph, and world record runs will occur at higher wind speeds over 30 mph gusting to 40 mph. Land sailing does not occur when the lake bed is wet, when wind speeds are too low, and when wind speeds are too high.

The potential for the project to impact to the wind patterns at Ivanpah Dry Lake are expected to be limited to when winds cross the project site towards the lake bed (when the project is upwind of the lake bed). The project site ranges from just less than two miles to the lake bed (Ivanpah 1) to just less than three miles to the lake bed (Ivanpah 3). The project site is very large so it can be upwind of some portion of the active land sailing area of the lake bed, using the extreme corners of the site border and lake bed border, when winds are from 200 degrees to 320 degrees, or a full one third arc of the compass. However, a 90 degree wind arc of concern (215 degrees to 305 degrees) is where the potential for maximum downwind impacts would occur as winds travel through longer cross-sections of the project site and through longer cross sections of the lake bed. Winds statistics (percent of annual) for these two arcs determined through two years of meteorological data from Jean, Nevada, are as follows:

Table 4.19-2
Percent of Total Annual Winds Occurring From a Direction in Which ISEGS is Up-Wind of Ivanpah Dry Lake Bed and Could Have an Effect on Land Sailing for Various Wind Speeds

Average Hourly Wind Speed	Wind From 200° to 320° Where ISEGS Could Have Some Effect	Wind From 215° to 305° Where ISEGS Could Have Its Maximum Effect
< 6 mph	5.8%	4.5%
> 6 mph	44.1%	33.4%
> 12 mph	21.3%	16.7%
> 18 mph	7.4%	6.7%
> 24 mph	2.4%	2.3%
> 30 mph	0.6%	0.6%
All Winds Within Arc	49.8%	38.0%

Winds between 12 mph and 30 mph (most desirable to land sailing) will cross any part of the project site and the lake bed more than 20 percent of the time, and for marginal winds that frequency increases to more than 40 percent of the time. Wind between 12 mph and 30 mph will go through deep cross sections of the project site and deep cross sections of the lake bed more than 16 percent of the time, and for marginal winds that frequency increases to more than 30 percent of the time. Therefore, the location of the site, based on its size and direction from the lake is a concern, and there is a potential impact to winds at the lake bed.

It can be seen from the wind statistics that winds higher than desired for land sailing occur very infrequently, so anything that would decrease wind speeds would not be beneficial, and anything that would increase wind speeds should be considered potentially beneficial to land sailing.

The ISEGS project will be comprised of low-lying heliostat mirrors that focus onto one solar power tower each at Ivanpah 1 and 2, and five solar power towers at Ivanpah 3. Additionally, larger buildings/structures will exist near the central power tower within the power block at each of the power plants, including an air cooled condenser that will have large, vertical, hot air exhaust streams. The specific components of the project that could impact local wind patterns are as follows:

Structural Components Impacting Wind Flow

1. The mirrors will to some degree block wind flow through the site at low heights.
2. The larger central area buildings will cause localized wind turbulence.

Energy Components Impacting Wind Flow

1. Project will cause a reduction in the natural heating of the soils and reduce temperature convection from the soils to the atmosphere (thermals)
2. There will be an increase in localized thermal effects at the power towers and the air cooled condensers

In general, any new structural components will increase drag and turbulence in the area and will take some energy out of the winds, reducing their average velocity. The extent of this energy loss is unknown; however, most of the turbulence, or downwash, from the buildings and mirror fields should dissipate within the two or more miles from the site to the lake bed.

The ISEGS project, as a solar energy project, works to take energy out of the natural system (approximately 1,000 MW with 400 MW made into useful electrical energy) and the mirrors would shade the ground and reduce ground heating and related convection from the hot ground into the atmosphere. Besides the convective heat reduction in the mirror fields, there will be concentrated heat rejection from the air cooled condensers and radiated and convective heat loss around the power towers. The bulk of the heat rejection will come from the ACCs, the three of which will reject more than 500 MW into the air under maximum operating conditions. The localized impact on wind flows around the ACCs will be more dramatic than at any other location within each of the power units, but this will generally impact winds aloft more than at ground level. However, there will be a suction effect below the ACCs that will create turbulence and modify the localized wind fields.

The project's total cumulative impact to ground level winds would be to cause a slight overall average decrease in ground level wind speeds and a slight increase in ground level wind turbulence; however, this would not cause an adverse impact to land sailing on Ivanpah Dry Lake.

Glare Impacts to Land Sailing

The proposed project would be visible to land sailors from the Dry Lake surface. The potential for this visibility to provide a nuisance to the land sailors, and potentially modify their use of the Dry Lake for their events, is evaluated in the subsection on Regional Recreational Resources above. In addition to this nuisance effect, the safety of land sailors could potentially be impacted by the bright glare that would result from the sun reflections to the receivers at the top of the seven power towers associated with the proposed project. The potential impact of this glare on drivers on I-15 is evaluated in Section 4.11 of this EIS, which concludes there would not be a health and safety impact associated with reflected solar radiation or glare. However, the concern in that section is that the distraction caused by the brightness of the power towers could increase the potential for accidents on the highway. This potential effect could also apply to land sailors traveling at high speeds (more than 100 mph) on the Dry Lake surface. Given the discussion in Section 4.11 and its associated mitigation, there would not be an appreciable adverse impact to motorists on I-15 and other local roads associated with glare. Therefore, considering land sailors would be at a greater distance from the power towers than motorists on I-15, there would not be an appreciable impact to land sailors associated with glare.

Impact Conclusions

The proposed project is not expected to have adverse impacts on recreational resources within the proposed project boundaries. This is because there are no substantial uses of the project area for recreation, and the rerouting of the affected routes of travel around the proposed project boundaries is expected to cause only a minor inconvenience.

ISEGS would have adverse impacts to recreational resources outside of the project boundaries attributable to the project diminishing the quality of the outdoor setting. These adverse impacts are not considered intense enough to cause visitation to decrease, because the recreationists are generally focused on a particular recreational experience, e.g. land sailing on Ivanpah Dry Lake, rock climbing on Clark Mountain, or hiking and camping in BLM wilderness, which will continue to be provided.

The proposed project is unlikely to notably impact the characteristics of wind or the Dry Lake surface that affects use for land sailing, if mitigation measures are implemented.

Closure/Decommissioning Impacts

Once operations of the generation plant have ceased, all generation facilities and equipment would be removed from the site, and the site would be re-contoured and reclaimed to mimic the natural setting. Roads that would not be needed for public access through the area would be reclaimed during this process. Roads that would be used by the public would not be reclaimed and would remain open to vehicular use. While reclamation would result in removing the attraction for those users who enjoyed the sight of the facility, it would restore the desert experience for those users who prefer to visit a more natural setting. Once the reclamation effort is complete, the lands would become available for the same types of dispersed recreational use as were available prior to construction. Therefore, the commitment of the project site for ISEGS is not permanent, although it is long-term. The viewscape would return to a more natural setting, once reclamation efforts were complete, although recovery of the site with native vegetation would likely take many years.

Beneficial Impacts

Approval of the proposed project would likely result in the attraction of a small number of visitors to the area who are interested in large-scale power and solar facilities.

4.19.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

With respect to the impact of fencing of the project acreage, which would remove the acreage from potential recreational use, the project area itself was not frequently used for recreational purposes, and the proposed project would not affect access to adjacent areas. Although the proposed project area includes OHV trails, these are primarily used to access other areas. By re-routing these trails around the facility, neither the proposed project nor the Mitigated Ivanpah 3 Alternative would result in an adverse impact to recreational access. Because it would result in a reduced amount of diversion, any impact on recreational access caused by the Mitigated Ivanpah 3 Alternative would be lower than that for the proposed project.

The development of the proposed project would not modify sedimentation or erosion on the Dry Lake bed, and would, therefore, not directly or indirectly affect recreational uses on the Dry Lake bed. The affect of the development of the Mitigated Ivanpah 3 Alternative on stormwater, including sedimentation and erosion characteristics downstream of the project area, would be less than that for the proposed project. Not only would the affected project area be reduced by 433 acres, but the area eliminated from the alternative would be the area of most active stormwater flow. Although the Mitigated Ivanpah 3 Alternative constitutes a reduction of approximately 12.5 percent in total developed acreage, the reduction of potential impact on stormwater flow pathways, and therefore potential modification of downstream sedimentation and erosion, would be disproportionate to the 12.5 percent acreage reduction. The Mitigated Ivanpah 3 Alternative would be expected to reduce potential downstream impacts to the Dry Lake bed by much more than 12.5 percent from those that might occur as part of the proposed project. Also, by reducing the number of heliostats, and therefore the amount of energy reflected to the power towers, the potential impact of the Mitigated Ivanpah 3 Alternative on wind characteristics in the area would also be reduced from those associated with the proposed project.

Beneficial Impacts

The proposed project would likely result in attracting a small number of visitors to the area specifically to observe a large-scale solar project. The affect of the Mitigated Ivanpah 3 Alternative in this respect would likely be the same as that for the proposed project.

4.19.2.3 Modified I-15 Alternative

With respect to the impact of fencing of the project acreage, which would remove the acreage from potential recreational use, the project area itself was not frequently used for recreational purposes, and the proposed project would not affect access to adjacent areas. Although the proposed project area includes OHV trails, these are primarily used to access other areas. One additional open trail wouild be affected by the reconfigured location of Ivanpah Unit 3. A segment of route 699238, which would be unaffected under the proposed project and Mitigated Ivanpah 3 Alternatives, would be cut off by the Modified I-5 Alternative. Meanwhile, route 699266, which would be affected under the proposed project and Mitigated Ivanpah 3 Alternatives, would be left unaffected under the Modified I-15 Alternative. Under the Modified I-15 Alternative, a plan to relocate route 669238 around the perimeter of the facility would be implemented. This perimeter route would be the subject of a right of way grant to the project applicant, and would be a grant of non-exclusive use. It would be constructed and maintained in the same manner as noted above for the proposed action perimeter routes. By re-routing these trails around the facility, neither the proposed project nor the Modified I-15 Alternative would result in an adverse impact to recreational access because the current casual uses of the routes could still take place on the right of way. Because it would result in an increased amount of diversion, any impact on recreational access caused by the Modified I-15 Alternative would be higher than that for the proposed project.

The development of the proposed project would not modify sedimentation or erosion on the Dry Lake bed, and would, therefore, not directly affect recreational uses on the Dry Lake bed. The affect of the development of the Modified I-15 Alternative on stormwater, including sedimentation and erosion characteristics downstream of the project area, would be expected to be similar to that for the proposed project, but cannot be fully evaluated at this time. This is because drainage channel mapping and stormwater modeling has not been completed for the revised Ivanpah Unit 3 location. As discussed in Section 4.10, the existing drainage channel mapping and stormwater modeling did cover a portion of the reconfigured location of Ivanpah Unit 3, and cursory visual inspection and review of topographic maps indicate that the reconfigured location of Ivanpah Unit 3 appears to be in a similar, or possibly somewhat more favorable position than the proposed Ivanpah Unit 3 location, with respect to the size of upstream drainage basins and associated active drainage channels. Therefore, the conclusion that the proposed project would not be expected to modify downstream sedimentation and erosion characteristics is assumed to be applicable to the Modified I-15 Alternative as well.

Also, by reducing the number of heliostats, and therefore the amount of energy reflected to the power towers, the potential impact of the Modified I-15 Alternative on wind characteristics in the area would also be reduced from those associated with the proposed project.

__Beneficial Impacts__

The proposed project would likely result in attracting a small number of visitors to the area specifically to observe a large-scale solar project. The affect of the Modified I-15 Alternative in this respect would likely be the same as that for the proposed project.

4.19.2.4 No Action

The No Action alternative would leave the land area undisturbed, and would therefore allow current recreational uses in the area to continue without interruption. The No Action alternative would also avoid diminishing the quality of outdoor recreational experiences in the Ivanpah Valley area by not contributing to a transformation from a mostly natural to a more industrial setting. Therefore, the No Action alternative would not affect recreational resources.

4.19.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

In general, the Federal laws and regulations (FLPMA and CDCA Management Plan) encourage multiple land uses, which recognize and protect the values associated with outdoor recreation. None of these laws and regulations prescribe the use of this or any property for recreational use only, so approval of the proposed project would not result in noncompliance.

4.19.4 Mitigation Measures

The proposed project is unlikely to notably impact the characteristics of the Dry Lake surface that affects use for land sailing, but only if mitigation measures are implemented. Mitigation measures for Hazardous Materials Management **HAZ-1** through **HAZ-6**, Waste Management **WASTE-1** through **WASTE-7**, and **Soil&Water-5**,

would address the potential for stormwater modification of the Dry Lake surface, as well as transport of hazardous materials, waste or debris to the Dry Lake surface.

Additionally, the Energy Commission staff proposed Condition of Certification **REC-1** to conform with Public Resources Code §25529 that would require the applicant to establish an area for public use by the development of a Solar / Ecological Interpretive Center.

REC-1: Prior to the start of construction and in conformance with § 25529 of the Warren-Alquist Act, the project owner shall prepare plans for a Solar / Ecological Interpretive Center to be developed in the ISEGS Construction Logistics Area and submit them to BLM's Authorized Officer and the CPM for review and approval. The plans shall propose a location that if possible provides a vantage point to observe as many features as is possible of the ISEGS project without compromising ISEGS security requirements. The Solar/Ecological Interpretive Center shall include the following features:

1. surfaced public parking for 12 vehicles (4 of which would allow vehicles with trailers);
2. information kiosks describing ISEGS solar energy technology;
3. picnic area with 8 shaded tables;
4. garbage cans;
5. interpretive signs identifying local landmarks and ecological features;
6. a two stall contained restroom facility (or a facility with flush toilets and sinks);
7. a drinking fountain; and
8. native plant landscaping with plant identification labels.

Prior to commercial operation of the first constructed power plant of the ISEGS development, the project owner shall complete construction of the Solar /Ecological Interpretive Center and request final approval by both BLM's Authorized Officer and the CPM. The project owner shall operate and maintain the Solar /Ecological Interpretive Center for the life of the ISEGS project.

Verification: At least 30 days prior to construction of the first power plant of the ISEGS development, the project owner shall submit plans for a Solar / Ecological Interpretive Center to be developed in the ISEGS Construction Logistics Area and submit them to BLM's Authorized Officer and the CPM for review and approval.

Prior to commercial operation, the project owner shall submit notice to BLM and the Energy Commission that it has completed construction of the Solar / Ecological Interpretive Center and shall request final approval by both BLM's Authorized Officer and the CPM.

After commercial operation and in each Annual Compliance Report for the life of the ISEGS project, the project owner shall provide a summary of estimated public utilization of the Solar / Ecological Interpretive Center and summarize any issues associated with operating and maintenance activities.

REC-2: The applicant shall allow and be required to afford public access to the routes for which BLM grants a right of way, as noted above.

Effectiveness: By allowing public access to the routes that are redirected around the project perimeter, the current level of public access to recreational areas would be maintained.

4.19.5 Summary

The proposed project location itself is not specifically permitted, used, or designated for any recreational activity. The proposed location represents a small portion of the overall area available for recreation in the Mojave Desert, and although the proposed project would require re-direction of access roads to recreation areas, the magnitude of this re-direction is expected to be small. However, the issue of recreational resources is still directly applicable to the proposed project because part of the attraction of the area, historically, has been driven by easy vehicular access to an unspoiled desert viewscape. The presence of the proposed facility would likely attract some tourists who are interested in unusual and large-scale industrial operations. While the impact on the quality of outdoor recreational experience would diminish the experience of campers, hikers, hunters, and some other recreational users, it would not likely affect the larger number of local tourists which include golfers, land sailors, and visitors to the Primm casinos.

The impacts related to changes in the viewscape, contributing to the transformation of a mostly natural to a more industrial setting, would be long-term, even though the land could be potentially restored and the associated viewscape as affected by the project could be repaired following facility decommissioning.

The project could potentially impact land sailing on the Ivanpah Dry Lake surface if it were to modify stormwater and sedimentation characteristics or result in hazardous materials, waste or debris being transported to the Dry Lake. Mitigation measures in Sections 4.5, 4.10, and 4.14 would mitigate these impacts by reducing the potential for their occurrence, and by requiring monitoring and response to any identified impacts. Also, the project would not notably modify wind characteristics, or impose a visual glare hazard that would affect the health and safety of land sailors.

The No Action Alternative would not have any impact on the characteristics or administration of recreational resources.

Overall, no direct or indirect impacts on recreational use of the project area, Dry Lake bed, and surrounding areas would be expected from the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. All three alternatives would likely provide a beneficial impact on tourism by attracting persons interested in the unusual and large-scale character of the facility. However, all three alternatives would also contribute incrementally to an increase in the industrial character of the area, which would likely result in reducing the quality of the recreational experience for many recreational users of the area.

Table 4.19-3
Comparison of Recreation Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Removal of acreage from recreational use	No potential impact	No potential impact	No potential impact	No potential impact
Closure of OHV routes and re-directing OHV routes around facility	Closure of portions of three routes, all re-directed around perimeter	Closure of portions of three routes, all re-directed around perimeter	Closure of portions of three routes, all re-directed around perimeter. Slightly longer re-direction than proposed project and Mitigated Ivanpah 3 Alternative	No potential impact
Restriction of access to recreational areas	Impact on existing trails would be minor, and mitigated through re-routing	Lower than proposed project, would be mitigated through re-routing	Higher than proposed project, would be mitigated through re-routing	No potential impact
Modifications affecting recreational use of Dry Lake bed	Impacts could occur, but analysis predicts no modification	Impacts could occur, but would be substantially less than proposed project	Impacts could occur, but would be similar to or less than proposed project	No potential impact
Cumulative impact on quality of recreational experience, and associated tourism	Incremental contribution to industrial character may impact a small number of recreationists.	Incremental contribution to industrial character approximately equal to proposed project	Incremental contribution to industrial character approximately equal to proposed project	No potential impact
Beneficial impact on tourism	Would attract small number of tourists	Attraction of tourists approximately equal to proposed project	Attraction of tourists approximately equal to proposed project	No potential impact

4.20 Land Use Plan Amendment Analysis

The proposed land use plan amendment to be made by the BLM is a site identification decision only. The proposed solar project and all of its alternatives are located within Multiple Use Class L. The classification designations govern the type and degree of land-use action allowed within the classification area. All land use actions and resource-management activities on public lands within a multiple-use class delineation must meet the guidelines for that class. Multiple use class L allows electric generation plants for solar facilities after NEPA requirements are met. These guidelines are listed on Table 1, Multiple Use Class Guidelines, to the CDCA Plan of 1980 (at page 15). The specific application of the multiple use class designations and resource management guidelines for a specific resource or activity are further discussed in the plan elements section of the CDCA Plan. In Class L designations, the authorized officer is directed to use his judgment in allowing for consumptive uses by taking into consideration the sensitive natural and cultural values that might be degraded.

The proposed site location for the ISEGS project meets the Multiple Use Class Guidelines (as applicable to the particular project/alternatives/site locations) as noted in the CDCA Plan for the following reasons:

1. Agriculture: Agricultural uses of Class L lands are not allowed, with the exception of livestock grazing. The site is not currently used for agriculture, and none of the project alternatives (proposed project, Mitigated Ivanpah 3 Alternative, Modified I-15 Alternative, or No Action Alternative) would involve use of the site for agriculture. Therefore, all four alternatives would be in conformance with this guideline.
2. Air Quality: Class L lands, including the proposed site location and the alternatives, are to be managed to protect their air quality and visibility in accordance with Class II objectives of the Federal Clean Air Act. The worst-case emissions that would be associated with the proposed project are provided in Table 4.1-11. These values have been compared to emissions objectives for air quality and visibility associated with Class II areas in 40 CFR 52.51, and are all well below the limitations required for Class II areas. The emissions associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those of the proposed project, and there would be no emissions associated with the No Action Alternative. Therefore, all of the alternatives would conform to the Class II objectives referenced in the CDCA Plan guidelines.
3. Water Quality: Class L designations will be managed to provide for the protection and enhancement of surface and groundwater resources, and BMPs will be used to avoid degradation and to comply with Executive Order 12088. Section 4.10 of this EIS evaluated the proposed project, Mitigated Ivanpah 3 Alternative, Modified I-15 Alternative, and the No Action Alternative for groundwater use conflicts, the potential to impact groundwater quality, and the potential to impact surface water resources. Development and operation of the ISEGS facility on an active alluvial fan raises concerns for changing stormwater surface flow across the project. The incorporation of low impact development practices with limited

grading, and limited removal of vegetation to maintain natural sheet flow across the site were developed by the applicant, in coordination with the BLM, to reduce these potential impacts. Although BLM has not established BMPs for solar projects, the agency has reviewed, and agrees with the implementation of, the BMPs that would be associated with the proposed project and its alternatives. These BMPs have been derived from a variety of sources, including those proposed by the applicant, those required by the Energy Commission through its Conditions of Certification, and those required for compliance with other state and Federal laws designed to protect water resources. Implementation of these BMPs, and BLM's standard term and condition requiring compliance with other Federal, state, and local regulations (as incorporated into mitigation measure **HAZ-6**), would constitute compliance with Executive Order 12088. The measures would be applicable to all project alternatives, and would therefore conform to the guidelines in Table 1 of the CDCA Plan.

4. Cultural and Paleontological Resources: Archaeological and paleontological values will be preserved and protected. Procedures described in 36 CFR 800 will be observed where applicable. As described in detail in Sections 4.4 and 4.16, cultural and paleontological resources associated with the development and operation of the proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative would not be impacted, and therefore all three alternatives would conform to the guidelines. The only site that would be disturbed by the proposed action and all the alternative sites that was identified as eligible for inclusion in the NRHP is the existing Hoover Dam to San Bernardino 115 kV transmission line. Replacement of a portion of the line will cause an adverse effect that is addressed under the terms of the Programmatic Agreement for the Eldorado Ivanpah Transmission Project. The identification of the site location for the proposed action or any of the alternative site locations are subject to the MUC Guidelines for cultural and paleontological resource protection as is evidenced by the applicability of the guidelines to the specific facility proposal. As such, all of the site locations and the site location alternatives are within the MUC Guidelines for cultural and paleontological resource protection established by the CDCA Plan.

5. Native American Values: Native American cultural and religious values will be protected and preserved on Multiple Use Class L lands with appropriate Native American groups consulted. Repeated efforts and opportunities have been provided to allow tribal entities to raise concerns. No tribal entities raised concerns with the proposed project site, or the sites for the Mitigated Ivanpah 3 and Modified I-15 Alternatives, therefore cultural guidelines with respect to requirements for consultation have been met. In addition, the protection of cultural resources, as discussed in Section 4.4 and in Item Number 4 above, ensures that preservation and protection of cultural and religious values is accomplished in accordance with the CDCA Plan MUC guideline.

6. Electrical Generation Facilities: Solar generation may be allowed after NEPA requirements are met. The analysis contained in the EIS, which addresses the

proposed action and its alternatives, comprise the NEPA compliance required for this MUC guideline.

7. Transmission Facilities: Class L guidelines allow electric transmission to occur in designated ROW corridors. The cumulative action described for the Eldorado Ivanpah Transmission project meets this guideline for the proposed project, Mitigated Ivanpah 3 Alternative, and the Modified I-15 Alternative by locating the new transmission line in an existing ROW corridor.
8. Communication Sites: The proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative would not involve the installation of communications sites.
9. Fire Management: Fire suppression measures in Class L areas will be taken in accordance with specific fire management plans, subject to such conditions as the authorized officer deems necessary. The project area is within the area covered by the BLM California Desert District and Needles Field Office Fire Management Plan, 2004. That Plan addresses management and suppression of wildfires, and does not address incidents on specific facilities such as power plants. The applicant has developed fire suppression measures that would be used for the proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative, and these measures are discussed in Section 4.15. However, the specific fire management plan is not relevant to the types of fires that would be addressed by the applicant. Should a fire occur in the area that is not specific to the facility, it would be addressed by BLM, not by the applicant, and it would be addressed in conformance with the Fire Management Plan.
10. Vegetation: Table 1 of the CDCA Plan includes a variety of guidelines associated with vegetation. These are addressed in the EIS as follows:

    Native Plants – Removal of native plants in Class L areas is only allowed by permit after NEPA requirements are met, and after development of necessary stipulation. Approval of the ROW grant for the proposed project, Mitigated Ivanpah 3 Alternative, or Modified I-15 Alternative would constitute the permit for such removal. The mitigation measures in the EIS and conditions of approval to be required in the Record of Decision would constitute the stipulations to avoid or minimize impacts from the removal.

    Harvesting of plants by mechanical means – Harvesting by mechanical means is also allowed by permit only. Although the proposed project and its alternatives would include the collection of succulents and seeds to assist with reclamation, the removal of these items would not be done for distribution to the public. Also, the guidelines for vegetation harvesting include encouragement of such harvesting in areas where the vegetation would be destroyed by other actions, which would be the case with the proposed project and its alternatives. Therefore, the proposed project and its alternatives would be in conformance with this MUC guideline.

    Rare, Threatened, and Endangered Species, State and Federal – In all MUC areas, all state and federally listed species will be fully protected. In addition, actions which may jeopardize the continued existence of federally listed species will require consultation with the U.S. Fish and Wildlife Service. As evaluated in Section 4.3, no federally or state listed plants would be impacted by the proposed project, Mitigated Ivanpah 3 Alternative, or the Modified i-15 Alternative.

Sensitive Plant Species – Identified sensitive plant species would be given protection in management decisions consistent with BLM's policy for sensitive species management, BLM Manual 6840. The objective of this policy is to conserve and/or recovered listed species, and to initiate conservation measures to reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing. One BLM sensitive plant, the Rusby's desert mallow, has been identified in the project area, and impacts and mitigation associated with this species were discussed in Section 4.4. In an effort to protect this species, BLM worked with the applicant, the Energy Commission, and the intervenors to develop mitigation and project alternatives to reduce the number of individuals of the species that would be affected. This protection was a substantial consideration in the development of the Mitigated Ivanpah 3 and Modified I-15 Alternatives, and selection of either of these two alternatives would be expected to provide greater protection to the species than would the proposed project. Because these measures are intended to reduce threats to this species to minimize the likelihood of listing, these measures are in conformance with the MUC guidance in the CDCA Plan.

Unusual Plant Assemblages (UPAs) – No UPAs have been identified on the site of the proposed project, Mitigated Ivanpah 3 Alternative, or Modified I-15 Alternative.

Vegetation Manipulation – Manipulation of vegetation in Class L areas by mechanical control or aerial broadcasting is not permitted. Vegetation manipulation is defined in the CDCA Plan as removing noxious or poisonous plants from rangelands; increasing forage production; creating open areas within dense brush communities to favor certain wildlife species; or eliminating introduced plant species. None of these actions would be conducted as part of the proposed project, Mitigated Ivanpah 3 Alternative, or Modified I-15 Alternative. Therefore, each alternative would conform with the guidelines.

11. Land Tenure Adjustment: Class L land will not be sold. The proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative would not involve any sale of public lands.
12. Livestock Grazing: The proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative would not involve the addition of livestock grazing to a Class I area where it does not already occur.
13. Minerals: The proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative would not involve the development of minerals on Class L lands.
14. Motorized Vehicle Access/Transportation: Pursuant to the CDCA LUP guidelines in Class L areas, new roads may be developed under ROW grants or approved plans of operations. In areas designated as limited use area for OHV use, such

as the site locations under consideration in this FEIS, changes to the transportation network (new routes, re-routes, or closures) in "limited" areas may be made through activity-level planning or with site-specific NEPA analysis (IM 2008-014). Modifications to area OHV designations (open, closed, or limited) require amendment to the RMP. There are no area OHV designations that are being made or modified through the proposed action or any of the alternatives. With the proposed action and its alternatives, existing routes are being closed, and new routes are being created in limited OHV areas. As such, these changes may be made with site-specific NEPA analysis. This analysis is provided in Section 4.19. The access needs for the proposed solar facility do not substantially differ among the various site location alternatives presented in the FEIS. For any of the site location alternatives, road ROW grants would be approved that allow for the reconstruction of Collosseum Road as the main access road to ISEGS. This activity falls within the CDCA LUP guideline noted above.

15. Recreation: The proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative would not involve the use of the proposed project or alternative sites for recreational uses.
16. Waste Disposal: The proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative would not involve the development of waste disposal sites on the proposed project or alternative sites
17. Wildlife Species and Habitat: Table 1 of the CDCA Plan includes a variety of guidelines associated with wildlife. These are addressed in the EIS as follows:

    Rare, Threatened, and Endangered Species, State and Federal – In all MUC areas, all state and federally listed species and their critical habitat will be fully protected. In addition, actions which may jeopardize the continued existence of federally listed species will require consultation with the U.S. Fish and Wildlife Service. As discussed in Section 4.3, the desert tortoise, which is listed as federally and state threatened, would be affected by the proposed project, Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. However, none of the alternatives would affect critical habitat. As specified in the guideline, BLM has initiated formal consultation with the U.S. Fish and Wildlife Service in accordance with Section 7 of the Endangered Species Act. BLM has worked with the Energy Commission, USFWS, CDFG, applicant, and intervenors to develop protection and compensation measures for the desert tortoise, which include stringent avoidance measures, the full level of compensation required by USFWS for this category of tortoise habitat, and enhancement and protection measures in other areas. Therefore, the proposed project and its alternatives would comply with the guideline to provide full protection to the species.

    Sensitive Species – Identified species would be given protection in management decisions consistent with BLM's policy for sensitive species management, BLM Manual 6840. The objective of this policy is to conserve and/or recovered listed species, and to initiate conservation measures to reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing. No BLM sensitive wildlife species (other than the desert tortoise, identified and discussed in the previous paragraph) are present on the sites associated with the proposed project and its alternatives.

The proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative, including the mitigation measures associated with these actions, would involve habitat manipulation to improve habitat (such as tortoise fencing along roads and placement of a water source in big horn sheep habitat) and introduction of native species (through the translocation of tortoises). Introduction of native species is permitted in Class L areas, and habitat manipulation is allowed subject to environmental assessment, as is done within this EIS. Therefore, the proposed project and its alternatives would be in conformance with these guidelines.

The proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative, including the translocation associated with these actions, would not involve the control of depredation wildlife and pests. Therefore, this guideline is not applicable to these actions.

18. Wetland/Riparian Areas: Wetland/riparian areas will be considered in all proposed land use actions. These issues were considered in the analysis of the site location for the proposed project and its alternatives. However, no wetlands or riparian areas are present in these areas.

19. Wild Horses and Burros: Under the CDCA Plan guidelines, populations of wild and free-roaming horses and burros will be maintained in healthy, stable herds, but will be subject to controls to protect sensitive resources. As discussed in Section 4.18, no wild and free-roaming horses are present in the project area. In the NEMO Plan Amendments, BLM established the AML for burros in the vicinity of the proposed project area at zero. Therefore, the proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternatives would conform with the requirements of the guidelines in the CDCA Plan.

5.0 Cumulative Effects

Introduction

Preparation of a cumulative impact analysis is required under NEPA. “Cumulative impact” is the impact on the environment that results from the incremental impact of the proposed project when considered with other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR §1508.7). Cumulative impacts analysis is intended to highlight past actions that are closely related either in time or location to the project being considered, catalogue past projects and discuss how they have harmed the environment, and discuss past actions even if they were undertaken by another agency or another person. Most of the projects discussed in this section have, are, or will be required to undergo their own independent environmental review under either CEQA or NEPA.

Under NEPA, an EIS must provide a sufficiently detailed catalogue of reasonably foreseeable future projects, and provide an adequate analysis of how these projects, in conjunction with past and present projects and the proposed action, are thought to have impacted or are expected to impact the environment. NEPA is designed to inform decision making and through disclosure of relevant environmental considerations, permit informed public comment.

Methodology

The first step in the analysis of cumulative effects associated with the proposed project and alternatives is the identification of the full range of past, present, and reasonably foreseeable projects that may require consideration within each resource-specific analysis. This is done in Section 5.1 below. Then, this section evaluates the cumulative impacts for each resource area, following these steps:

- Define the geographic and temporal scope of cumulative impact analysis, based on the potential area within which impacts of the ISEGS project and its alternatives could combine with those of other projects, and the known or expected timing of the other projects.
- Evaluate the effects of the ISEGS project and its alternatives, in combination with past and present (existing) projects within the geographic and temporal scope.
- Evaluate the effects of the ISEGS project and its alternatives with foreseeable future projects that occur within the area of geographic effect and temporal scope.

Geographic and Temporal Scope of Cumulative Analysis

The area of cumulative effect varies by resource. For example, air quality impacts tend to disperse over a large area, while traffic impacts are typically more localized. For this reason, the geographic scope for the analysis of cumulative impacts must be identified for each resource area. The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resource being evaluated. The geographic scope of each analysis is based on the topography surrounding the ISEGS project and its alternatives, and the characteristics of each resource.

In addition, each project in a region will have its own implementation schedule, which may or may not coincide or overlap with the ISEGS project's schedule. This is a consideration for short-term impacts from the ISEGS project. The cumulative analysis includes an evaluation of the likely timeframe of implementation of future projects.

Evaluation of Past and Present Conditions

For each resource area, the affected environment, as discussed in Section 4, is assumed to represent the cumulative effect of past projects in the region. For example, the establishment of baseline toxic air pollutant concentrations in Section 4.1 represents the cumulative impact of past and current air emissions sources in the region, and is the baseline from which impacts of the proposed project, and other reasonably foreseeable future projects, could add.

Project Effects in Combination with Foreseeable Future Projects

The discussion of impacts within each resource area evaluates the impacts of the proposed project and its alternatives on top of the current baseline—the past, present (existing), and reasonably foreseeable or probable future projects within the geographic scope. Reasonably foreseeable projects that could contribute to the cumulative effects scenario depend on the extent of resource effects, but could include projects in the immediate Ivanpah area, as well as other projects in the region.

Analysis of Cumulative Impacts

The analysis presented for each resource area describes the geographic area of effect for that discipline and the potential cumulative effects of the ISEGS project and its alternatives with the other existing and reasonably foreseeable or probable future projects defined on the tables and maps presented in this section. Where impacts are identified, BLM identifies a measure to avoid or minimize environmental harm.

5.1 Past, Present, and Reasonably Foreseeable Actions

Table 5-1 lists the existing projects in the Ivanpah Valley area which have historically contributed to cumulative impacts to environmental resources at issue in the proposed ISEGS project and alternatives, and **Table 5-2** summarizes the reasonably foreseeable future projects in the area. The locations of these projects, with respect to the proposed ISEGS facility, are shown in **Figure 5-1**. In general, it is assumed that the projects and developments in close proximity to the proposed project and its alternatives are those most likely to contribute to adverse cumulative impacts, and those further away are less likely to contribute to those impacts. Therefore, this section also provides a detailed description of those projects located in Ivanpah Valley

Table 5-1
Existing Projects in the Ivanpah Valley

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
1	Bighorn Electric Generating Station	Primm, Nevada (approximately 4 miles northeast of the proposed project)	Reliant Energy Wholesale Generation, LLC	Existing, producing energy since 2004	Operating 570 MW natural gas power plant, uses dry cooling system	Land Use, Air Quality, Greenhouse Gases, Hazardous Materials, Waste Management, Public Health, Visual Resources, Transmission Line Safety and Nuisance
2	Primm Casinos: Buffalo Bill's, Primm Valley, Whiskey Pete's	I-15 at state line, NV 31900 Las Vegas Blvd. South. Primm (approximately 4 miles northeast of the proposed project)	Terrible's Primm Valley Casino Resorts (MGM Mirage)	Existing, undergoing renovation	Two existing Resort and Casinos and one existing Hotel and Casino	Land Use, Traffic and Transportation, Socioeconomics, Recreation, Visual Resources
3	Primm Valley Golf Course	3 miles south of state line in California, (less than one mile from project site)	Terrible's Primm Valley Casino Resorts (MGM Mirage)	Existing	Existing golf course located south of the California/Nevada border along I-15, opened in 1997, approximately 22-acres	Land Use, Recreation, Socioeconomics, Soil and Water
4	Primm Outlet Mall	Primm, Nevada 32100 Las Vegas Blvd. S. Primm, NV (approximately 4 miles northeast of the proposed project)	Fashion Outlets (MGM Mirage)	Existing since 1998	Existing shopping outlet with over 100 stores. Connected to the Primm Casinos by monorail, approximately 359,000 square feet of leasable area and 1,600 parking spaces. More than one million vehicles pass the Fashion Outlets per month.	Land Use, Traffic and Transportation, Socioeconomics, Recreation, Visual Resources

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
5	Recreation Activities	Ivanpah Dry Lake (approximately 1 mile from proposed project)	BLM	Ongoing	Approximately 200 casual use permits are issued annually (these cover between 1 individual to 6 individuals) and approximately 5000 annual visitors. Approximately 12 Permitted and Organized events occur on the Dry Lake annually on both east and west sides. (Approximately 50% of these permitted and organized events occur on the west side and 50% on the east side, although the largest of the events tend to occur on the east side of the Dry Lake.) Permits are also given out that include use of both sides. Examples of such events include: • Archery events • Kite buggying • Land Sailing	Recreation, Land Use, Socioeconomics, Traffic and Transportation
6	Molycorp	Mountain Pass, Sulphide Queen Property	Molycorp Minerals	Ongoing, expected to continue until mid-2020.	Existing mining operation on Mountain pass, property was acquired by Molycorp in 1950 and has been mined since, Molycorp was acquired by Unocal in 1977, which was acquired by Chevron-Texaco in 2005. In 2009, the facility was acquired and became Molycorp Minerals, LLC.	Land Use, Geology, Paleontology, and Minerals, Socioeconomics, Traffic and Transportation, Soil and Water, Biological Resources, Visual Resources, Hazardous Materials, Waste Management, Worker Safety, Air Quality, Public Health

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
7	Colosseum Mine	12 miles west of Primm, Nevada (approximately 6 to 7 miles from Ivanpah site)	Lac Minerals	Inactive – as of early 1990s. Remedial action undergone.	Mining facilities occupied approximately 1,000, now located in the Mojave National Preserve.	Soil and Water, Waste Management, Air Quality
8	Clark Mountain and Crescent Peak Allotment 10 Year Lease CA-690-EA06-25	Northern Clark Mountain Range (surrounds the proposed project)	Allotment #09003	Ongoing	Grazing Lease. Project would remove 4,065 acres of Clark Mountain Grazing Allotment.	Livestock Grazing, Land Use, Biological Resources, Socioeconomics
9	Molycorp (Now Chevron Environmental Management Company) Evaporation pond	Southeast of the Ivanpah Dry Lake (Approximately 3.25 miles from project)	Chevron	Closed, pending final closure	Pond was used for the disposal of mining-related wastewater from 1988 to 1998. Site is currently undergoing environmental investigation (soil and groundwater), and the owner is awaiting regulatory approval of their plan to cap the pond in place.	Land Use, Soil and Water, Hazardous Materials, Waste Management, Visual Resources, Recreation
10	AT&T Fiber-optic replacement of cables	Along the west side of the Ivanpah Dry Lake and of I-15	AT&T	Environmental Assessment of project was released in July 2008.Project was completed in 2009.	Existing direct buried fiber-optic cable was replaced from Nevada border to the Halloran Summit, including a segment adjacent to the ISEGS project to the west of the Ivanpah Dry Lake. Used existing 10 foot ROW with some temporary larger ROW for where existing cable must be replaced.	Land Use
11	Existing 115-kV transmission line from El Dorado substation (Hoover-to-San Bernardino)	Through Ivanpah SEGS site	SCE	Active	SCE 115 kV ROW is located at ISEGS proposed site. This 115 kV is located in the BLM transmission corridor. An additional BLM corridor is located north of the ISEGS proposed site.	Transmission Line Safety and Nuisance, Visual Resources

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
12	Molycorp (Now Chevron Environmental Management Company) pipeline	Runs from Molycorp south of I-15, through the Mojave National Preserve to the Evaporation pond	Chevron Environmental Management Company	Closed, currently being removed	13-mile long pipeline that runs between the Molycorp mine and the evaporation pond. During summer of 1996, 11 releases were experienced in the 13.mile long pipeline that carries waste discharge to the evaporation pond. With the exception of two minor and localized areas of contamination spill-related material was removed by the fall of 2000. Pipeline and contaminated soils are currently being removed by Chevron.	Land Use, Hazardous Materials, Soil and Water, Waste Management, Biological Resources
13	Jean/Roach Dry Lake SRMA	Large portion (224,931 acres) of the Nevada side of Ivanpah Valley, from north of Jean to California state line.	BLM	Existing	Jean/Roach Dry Lake Special Recreation Management Area provides opportunities for casual use and other types of recreation, including motorcycling, all-terrain vehicle and 4 x 4 driving, horseback riding, mountain biking, small-game hunting, and organized racing events.	Recreation, Biological Resources, Air Quality, Traffic and Transportation
14	Kern River Pipelines	North of Ivanpah SEGS	Kern River	Existing	Natural gas transmission lines	Land Use, Hazardous Materials

Sources: BLM 2006; BLM 2008d; BLM 2008e; BLM 2008f; BLM 2008c; Chevron 2008; Downing 2008; EPA 1992; EPA 1993; Fashion Outlets; Kerns 2008; Lahontan Regional Water Quality Control Board 2001; Terrible's Primm Valley Casino Resorts.

Table 5-2
Future Foreseeable Projects in the Ivanpah Valley Area

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
A	Stateline Solar CACA 48669	Ivanpah, south of Calif./Nevada line T17N/R14E	FirstSolar	Application on file with BLM Needles Field Office	300 MW Photovoltaic 4,160 acres land requested	Land Use, Biological Resources, Visual Resources, Soil and Water, Cultural Resources, Traffic and Transportation, Air Quality, Socioeconomics, Recreation, Air Quality
B	Southern Nevada Supplemental Airport	30 miles South of the McCarran International Airport - Note outline of purple around the project depicts the airport noise compatibility area	Clark County Department of Aviation	Draft EIS was in progress, but suspended June 2010. New reports in June 2010 suggest project on hold.	International Airport to supplement the McCarran International Airport in Las Vegas • 5,934 acre site • 17,000 acre sphere of influence • Adjacent to desert tortoise relocation site	Air Quality, Greenhouse Gases, Biological Resources, Cultural Resources, Hazardous Materials, Land Use, Noise and Vibration, Public Health, Socioeconomics, Soil and Water, Traffic and Transportation, Visual Resources, Waste Management, Recreation

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
C	Victorville-Las Vegas High Speed Train	Train along the I-15 between Victorville and Las Vegas	DesertXpress Enterprises	Draft EIS was published in March 2009 and the public comment period ended on May 22, 2009.	DesertXpress would run from Victorville to Las Vegas. It hopes to operational by 2012.On August, 2006, DesertXpress submitted a ROW application to the BLM for portions of the corridor between Victorville and Las Vegas that would be located on BLM land. Two alternative alignments in the vicinity of the east approach to Mountain Pass on Interstate 15 were identified. In November, 2006 BrightSource submitted an application to the BLM for a ROW grant to construct and operate the ISEGS facility. The BLM notified DesertXpress that one of its proposed route segments – Segment 4B – travelled through two proposed solar projects, ISEGS and a proposed solar power plant by OptiSolar, Inc. In January, 2009 BLM sent a letter to DesertXpress, BrightSource, and OptiSolar alerting the parties of the conflict and urging them to consult together to determine if there is a mutually agreeable solution so that the projects could co-exist. As a result of the coordination meetings, DesertXpress developed several potential alternatives to avoid the ISEGS project area.	Land Use, Traffic and Transportation, Biological Resources, Livestock Grazing, Recreation, Visual Resources, Socioeconomics

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
E	Joint Port of Entry CA-690-EA06-01	Between Yates Well Road and Nipton Road, San Bernardino County	CALTRANS, California Dept of Food and Ag (CDFA)	Caltrans submitted a Recreation and Public Purposes Act Lease application to the BLM for the JPOE facility	Joint Port of Entry would include an Agricultural Inspection Facility and a Commercial Vehicle Enforcement Facility located on the north side of Interstate 15 between Nipton Road and Yates Well Road. Total 133 acres.	Traffic and Transportation, Visual Resources, Biological Resources
G	Mixed-use Development	166 acres near Jean, Nevada	MGM Mirage and Jeanco Realty Development, LLC	Demolition of the Nevada Landing Casino as the first phase of the proposed new development to begin in April. Note: On hold due to International Airport plans, will not be replaced at least until building of new airport is begun if not complete.	MGM Mirage announced a joint-venture partnership with two Las Vegas-based developers to turn undeveloped land on both sides of Interstate 15 into a community that features affordable housing, commercial businesses, shops and a new hotel-casino. This would include the demolition of two casinos MGM Mirage currently owns in Jean.	Land Use, Traffic and Transportation, Socioeconomics, Recreation, Visual Resources
H	Clark Mountain and Crescent Peak Allotment 10 Year Lease CA-690-EA06-25	Northern Clark Mountain Range	Allotment #09003	In Progress	Grazing Lease	Livestock Grazing, Land Use, Biological Resources, Socioeconomics

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
I	Ivanpah Energy Center	Primm, Nevada	Diamond Generating Corporation	Construction was to begin in the first quarter of 2006. No construction currently taking place	500 Mw gas-turbine combined-cycle power plant	Land Use, Air Quality, Greenhouse Gases, Hazardous Materials, Waste Management, Public Health, Visual Resources, Transmission Line Safety and Nuisance
J	PPM Wind energy power plant CACA 44988	Mountain Pass T15N/R14E R151/2N/R14E	PPM Energy	Application received 10/15/02 & 08/04/06 Testing & monitoring – 2nd Term	75 Mw wind energy project 2,330 acres Military: Red	Land Use, Biological Resources, Transmission Line Safety and Nuisance, Visual Resources
M	Power Partners SW Solar Application NVN 86156	West of Jean, NV.	Power Partners Southwest LLC	Application received 9/19/09, additional information requested by BLM.	Solar Power Plant to generate 250 MW, located on approximately 10,814 acres near Jean, NV.	Land Use, Biological Resources, Visual Resources, Soil and Water, Cultural Resources, Traffic and Transportation, Air Quality, Socioeconomics, Recreation, Air Quality
N	Eldorado-Ivanpah Transmission Project	Along northern transmission lines of Southern California Edison (SCE)	SCE	Project filed June 2009, Draft EIS published April, 2010	Construct a new Ivanpah Substation sized to accommodate 220 / 115 kV facilities. Remove approximately 36 miles of a portion of the Eldorado-Ivanpah leg of the existing Eldorado-Baker-Cool Water - Dunn Siding - Mountain Pass 115 kV line and construct a double circuit 220 kV line.	Transmission Line Safety and Nuisance, Cultural Resources, Visual Resources, Air Quality

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
O	Mixed Use - Recreation	Ivanpah Dry Lake	BLM	Numbers are approximate for annual use. The use is expected to continue into the foreseeable future.	Approximately 200 Casual Use permits are issued annually (these cover between 1 individual to 6 individuals). Approximately 12 Permitted and Organized events occur on the Dry Lake annually on both east and west sides. (Approximately 50% of these permitted and organized events occur on the west side and 50% on the east side, although the largest of the events tend to occur on the east side of the Dry Lake.) Permits are also given out that include use of both sides. Annual dry-sailing and buggy events include: • Ivanpah Playa Commercial Landsailing Tours • Land sailing and wind buggy regatas	Recreation
P	New fast food restaurant	Primm, NV	Unknown	In permitting process, application received by the Clark County permitting office 2/7/08	Fast food restaurant to be built adjacent to the Primm Outlet Mall (32100 S. Las Vegas Blvd.)	Traffic and Transportation

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
Q	Silver State Solar	Just south of Primm, Nevada, on the California/ Nevada border	NextLight Renewable Power, LLC	Application in to the Las Vegas BLM Field Office	Two solar power plants are proposed by NextLight Renewable Power, LLC at the Nevada/California border. One is a 250 MW solar trough project on approximately 2,500 acres (Serial number NVN 085801). Construction expected to take 32 months.	Land Use, Biological Resources, Visual Resources, Soil and Water, Cultural Resources, Traffic and Transportation, Air Quality, Socioeconomics, Recreation, Air Quality
Q	Silver State Solar	Just south of Primm, Nevada, on the California/ Nevada border	NextLight Renewable Power, LLC	Application in to the Las Vegas BLM Field Office	Two solar power plants are proposed by NextLight Renewable Power, LLC at the Nevada/California border. One is a 500 MW solar trough project on approximately 4,700 acres (Serial number NVN 085077).	Land Use, Biological Resources, Visual Resources, Soil and Water, Cultural Resources, Traffic and Transportation, Air Quality, Socioeconomics, Recreation, Air Quality
R	Cogentrix NVN 083083 and 083129	East, southeast of Jean, NV.	Cogentrix Solar Services LLC	Application received 1/18/07, additional information requested and received	Solar thermal energy facility for approximately 9.760 acres and 19,840 acres respectively. Mining claims identified in the same area.	Land Use, Biological Resources, Visual Resources, Soil and Water, Cultural Resources, Traffic and Transportation, Air Quality, Socioeconomics, Recreation, Air Quality

ID #	Project Name	Location	Ownership	Status	Project Description	Potentially Affected Resources
S	Southern Nevada Regional Heliport	North of Jean	Clark County Department of Aviation	BLM issued Finding of No Significant Impact in March 2008.	Permanent disturbance of 236 acres	Air Quality, Greenhouse Gases, Biological Resources, Cultural Resources, Hazardous Materials, Land Use, Noise and Vibration, Public Health, Socioeconomics, Soil and Water, Traffic and Transportation, Visual Resources, Waste Management, Recreation
	CalNev Pipeline upgrades and additional line in same ROW	On east side of I-15	Kinder Morgan	In environmental review	Petroleum fuel transportation pipeline	Land Use, Hazardous Materials

Sources: BLM 2008d; BLM 2008e; BLM 2008f; CALTRANS 2008; CPUC 2008d; Chevron 2008; DOE 2003; DesertXpress high Speed Train 2008; Downing 2008; Federal Railroad Administration 206; Kerns 2008; NextLight Renewable Power LLC 2008; OptiSolar 2008; Southern Nevada Supplemental Airport 2008; Non-Interference Agreement by and between BridghtSource Energy, Inc. and DesertXpress Enterprises, LLC.

5.1.1 Future Foreseeable Project Descriptions

Projects that are expected to be most significant in terms of cumulative impacts are those which have the following characteristics:

- Those in closer proximity are expected to contribute to cumulative impacts to a greater degree than those farther away.
- Those of larger scale are expected to contribute to a greater degree than smaller-scale projects.

In general, projects in Ivanpah Valley, California, and Ivanpah Valley, Nevada, are more likely to contribute to cumulative impacts than those located outside of the valley. Therefore, this section provides a more detailed discussion of the features and impacts of those reasonably foreseeable future projects that could contribute cumulative impacts to those of the ISEGS, including:

- Eldorado – Ivanpah Transmission Project;
- Stateline Solar (FirstSolar);
- DesertXpress Rail Facility;
- NextLight Solar -- Silver State Solar North and Silver State Solar South;
- Southern Nevada Supplemental Airport -- Ivanpah Valley Site; and
- Southern Nevada Regional Heliport.

Eldorado – Ivanpah Transmission Project

SCE intends to upgrade the Eldorado – Ivanpah segment of its existing 415-amp, 115-kV Eldorado – Mountain Pass Transmission Line to 220-kV service. The existing transmission line originates at Eldorado Substation near the City of Boulder City, crosses the McCullough Range, and crosses Ivanpah Valley near the ISEGS Project site. The line originally was constructed in 1931 within a 100-foot-wide ROW on steel H-frame lattice structures with a nominal height of 55-feet (Lorenzo 2006). Reconstruction of the line would be within the existing ROW. Therefore, additional lands necessary for the project would be minimal.

The BLM and CPUC published a Notice of Availability of the Draft EIS/EIR on May 7, 2010. In the Draft EIS/EIR, BLM and CPUC identified major, adverse, and unavoidable impacts to aesthetics and visual resources. For all other resource areas, impacts were determined to either be less than significant, or, for CEQA purposes, reduced to a less than significant level with mitigation measures. However, impacts to these other resources could potentially contribute to cumulative impacts in combination with the Ivanpah SEGS and other projects.

The Draft EIS/EIR identified the following cumulative impacts:

- The degradation of existing visual character or quality would be adverse during construction, and moderate during operations due to a moderate change in color of the landform and moderate contrast with existing structures.

- Temporary ambient air quality impacts caused by construction would contribute substantially to an air quality violation, and would be adverse.
- Temporary emission increases of NOx, VOCs, and PM10 during construction would contribute to a net increase of a criteria pollutant in a non-attainment area.
- The project, in conjunction with other projects, would result in cumulative impacts on native vegetation communities, including cacti and yucca species, and would adversely affect special management areas due to temporary and permanent habitat loss.
- The direct or indirect loss of listed or sensitive wildlife and associated habitat, including desert tortoise, would be adverse. This includes the contribution of the project to cumulative impacts to movement corridors and migratory paths.
- The lowering of a water table or interference with aquifer recharge, when combined with groundwater use by Primm and the Primm golf course, would be adverse. This includes both short-term use of water for construction, as well as the project's contribution to increased long-term water consumption.
- Construction-related traffic would contribute incrementally to an adverse cumulative impact on traffic load and capacity, including Level of Service of I-15 on Friday afternoons and evenings.

In the ISEGS DEIS, BLM presented a section titled "Cumulative Analysis of SCE Transmission Upgrades", beginning on Page 5-19. That analysis was based on the only information available at the time, which was SCE's Proponent's Environmental Assessment (PEA). Since that time, BLM and CPUC have published the Draft EIS/EIR for the EITP project. The Draft EIS/EIR is based on updated project description information, and includes a revised analysis of the project's direct, indirect, and cumulative impacts. Therefore, the Draft EIS/EIR supersedes the "Cumulative Analysis of SCE Transmission Upgrades", as presented in the ISEGS DEIS, and that section has not been included within this FEIS. Instead, the information in the EITP Draft EIS/EIR has been incorporated into the cumulative analysis in this section of the ISEGS FEIS.

Stateline Solar (FirstSolar)

The Stateline Solar facility would be constructed using thin film PV technology at a location that was originally to be developed by Gen 3 Solar and more recently by Optisolar. Stateline Solar is located west of I-15, south of the Nevada/California state line, and adjacent to the proposed ISEGS facility. The project would be constructed as a series of movable photovoltaic panels within the 4,168 acres and would be rated at 300 MW. Construction of Stateline would be completed during 2015 and construction would not be expected to coincide with that of the ISEGS.

Impacts to air quality would be limited to increased airborne PM10 during and following construction as a result of soil disturbance and lack of vegetation. Construction impacts to biological resources are expected to be similar to those associated with ISEGS as both projects would occupy and fragment comparable acreages on the bajada that provide habitat for desert tortoise and avian and terrestrial species. Impacts to cultural resources would be avoided or mitigated. The loss of 4,168 acres of public lands would adversely affect recreational opportunities within the project site. Recreation use losses would be largely limited to casual uses rather than organized activities. Installation of solar PV panels within 4,168 acres would decrease the availability of permeable soils within the area and increase stormwater runoff. Runoff and related sediment transport also would increase as a result of reduced vegetation. Increased runoff likely would affect Ivanpah Dry Lake during stormwater runoff events. Development of the project site would result in visual impacts within an area that presently consists of undeveloped desert. Project construction would likely require grading, which could impact previously unknown cultural resources within the project area. The project would also result in impacts to traffic on I-15 from increased trips associated with construction workers and deliveries. These impacts would be much less during operations due to the much lower number of workers.

DesertXpress Rail Facility

DesertXpress Enterprise is proposing to construct and operate a high speed rail system between Victorville, California, and Las Vegas, Nevada, a distance of approximately 180 miles. The facility would operate at speeds up to 150 miles per hour on either diesel electric power or electric power supplied through overhead centenary lines.

Feasibility of the project is based on proven steel-wheel technology, relatively flat terrain, relatively straight ROW, and availability of public lands. Tentative plans call for construction of the rail line parallel and adjacent to the I-15 corridor; the rail line would extend through Ivanpah Valley, California, and Ivanpah Valley, Nevada, with possible stops in Primm and the proposed Southern Nevada Supplemental Airport Ivanpah Valley site. A 40-mile-long, 500-foot-wide corridor has been assumed for analysis purposes. Project benefits would:

- reduce the use of fossil fuels;
- reduce car, bus, and airplane exhaust emissions;
- relieve overcrowded McCarran Airport;
- reduce traffic demand on I-15;
- reduce highway travel time and stress;
- reduce highway accidents;
- avoid the need to widen 150 miles of I-15;
- enhance rail facilities in southern California; and
- provide construction jobs.

DesertXpress is in the planning phase of development, and the route and construction dates have not been established. Currently, two routes are under consideration. The preferred alternative would be aligned with I-15 and pass east of ISEGS, but would thus go through the Mojave National Preserve. The alternative route would pass along the base of the mountains west of ISEGS, and would then require a tunnel to exit on the west side of the Clark Mountain Range.

It is likely that ISEGS would be in full operation prior to construction of DesertXpress and cumulative impacts associated with construction of the two projects are not anticipated. The cumulative impact of the operation of the two facilities would vary depending on the route selected for DesertXpress.

DesertXpress is expected to result in a beneficial reduction of traffic on I-15. The project also is expected to result in beneficial impacts to air quality and traffic safety as a result of reduced motor vehicle use along the interstate. Reduced air pollution from vehicles on I-15 would result in partially off-setting air quality impacts from the ISEGS, Southern Nevada Supplemental Airport, and the Southern Nevada Regional Heliport.

Development and operation of DesertXpress would adversely impact visual resources in Ivanpah Valley and contribute the cumulative degradation of visual resources in the area. Motorists travelling north along I-15 would be visually impacted by the presence of the rail system and ISEGS in the same viewshed. Similar visual impacts would result from construction in Ivanpah Valley, Nevada, where views already have been degraded by casinos and retail facilities in Primm and Jean, and the Bighorn Generating Facility. Additional visual impacts would result from the Silver State North and South facility, the Southern Nevada Supplemental Airport, and the Southern Nevada Heliport. As a whole, impacts from existing facilities, ISEGS, and other reasonably foreseeable future projects would result in adverse cumulative visual impacts. Similar adverse cumulative impacts would result from views from the recreational use areas in the Clark Mountains and Mojave National Preserve.

DesertXpress would have little or no impact on night sky views. Therefore, there would be no cumulative impacts to night sky resources.

DesertXpress would require use of public lands in Ivanpah Valley. An undetermined amount of relatively undisturbed desert habitat would be eliminated due to rail construction which would result in direct and indirect impacts to desert tortoise and other terrestrial species. ROW across the playa floor would result in minimal impacts to habitat due to a lack of vegetation. However, impacts likely would contribute to adverse cumulative impacts associated with the ISEGS Project and other foreseeable future projects.

DesertXpress would contribute to cumulative impacts to recreational resources. Installation of the rail line would block public access to public lands along some areas, and some land that would otherwise be available for public use would be lost.

DesertXpress would not affect cultural resources, but would minimally affect geology and soils, surface waters, and groundwater in the area.

NextLight Solar – Silver State Solar North and Silver State Solar South

NextLight Renewable Power LLC proposes to construct two adjoining solar photovoltaic facilities in Ivanpah Valley, Nevada. Silver State Solar North and Silver State Silver South would be east of Primm, north of the Nevada/California state line, and east of the proposed Southern Nevada Supplemental Airport Ivanpah Valley project site and the existing Bighorn Generating Facility. Silver State North and Silver State South would produce a total combined output of 400 MW and would occupy a total of more than 8,300 acres that are located on the bajada originating from the Lucy Gray Mountains.

A construction date has not been established; however, it is likely that construction of the Silver State projects would coincide with that of the ISEGS project. Therefore, construction impacts of both projects could be cumulative.

BLM published a Draft EIS for the Silver State projects in April, 2010. The Draft EIS identified the following cumulative impacts:

- Air Quality could be impacted as a result of particulate emissions from the overlap of construction of the Silver State projects with the EITP project and the CalNev pipeline project.
- Groundwater use could be impacted, from the combination of water use from the Silver State projects with those of the Primm casinos, Primm Golf Course, Molycorp mine, and Ivanpah SEGS.
- Unavoidable adverse impacts to vegetation and habitat loss would occur, in combination with the Southern Nevada Supplemental Airport, EITP, and Ivanpah SEGS.
- The proposed action would provide 8,373 acres of loss of habitat for desert tortoise to a total of 52,950 acres of habitat that would be lost due to the combination of the proposed action, Southern Nevada Supplemental Airport, DesertXpress, Ivanpah SEGS, and other projects in Ivanpah Valley in California and Nevada.
- Unavoidable visual resource impacts would occur.
- Changes in access to recreational resources would create unavoidable, unmitigable impacts.
- The impact of the Silver State projects and other projects on traffic on Interstate 15 would be adverse.

Adverse visual impacts would likely occur as large expanses of relatively undisturbed desert would become industrialized through the installation of photovoltaic panels, access roads, and support facilities. Those facilities cumulatively would contribute to visual impacts from the proposed ISEGS project, largely because Silver State Solar South and Silver State Solar North would be within 4 to 8 miles from the ISEGS site. Existing visual impacts within the area would be compounded by the Bighorn Generating Facility and casinos and retail facilities at Primm. Impacts would be further compounded with foreseeable future projects such as DesertXpress and the Southern Nevada Supplemental Airport.

The project would eliminate 8,373 acres of habitat for the desert tortoise and nearly all other terrestrial and avian species. Vegetation would be mechanically removed and controlled in a manner that would be similar to that of the ISEGS Project. The project also would result in habitat fragmentation. Effects of habitat loss and habitat fragmentation from the Silver State projects would be adverse.

Windblown and waterborne erosion likely would take place throughout most of the alluvial fan (7,840 acres). If left unchecked, surface water flows would result in sediment transport and potentially increased volumes of water and sediment to Roach Lake (Nevada). Ivanpah Dry Lake (California) (the site of the ISEGS Project). Ivanpah

Valley, Nevada and Ivanpah Valley, California are not linked by surface hydrology; however, runoff patterns on the alluvial fan indicate that approximately 30 percent of the project area (2,350 acres) flows to Ivanpah Dry Lake in California; 70 percent (5,488 acres) flows to Roach Lake. Therefore, cumulative effects to surface water flows from the Silver State projects would contribute to increased cumulative totals of sediment from Silver State South and ISEGS to Ivanpah Dry Lake (California). Increased sediment flows to Roach Lake (Nevada) also would be increased, but would not be considered as a cumulative impact associated with the ISEGS Project.

Earth moving equipment that would be needed for construction would increase the potential for non-native and noxious weeds in the area. Although they would be monitored and controlled to the extent practicable, it is likely that they would add cumulatively to weed infestation related to other reasonably foreseeable future projects.

The proposed Silver State project sites traditionally have been used for recreational purposes. Portions of the 7,840 acres frequently have been used for off-road races. The cumulative effects of lost recreational acreage in Ivanpah Valley, Nevada, and the lost recreational opportunities due to the ISEGS project could represent an adverse impact to recreational opportunities in the area (NextLight Solar 2010).

The project would not affect cultural resources because potentially affected resources either would be avoided or mitigated. The project would contribute cumulatively to the degradation of Native American Traditional Use Areas. The project would not affect geology or groundwaters in the area; however, mining would be excluded from the area.

The project would also result in impacts to traffic on I-15 from increased trips associated with construction workers and deliveries. These impacts would be much less during operations due to the much lower number of workers.

Southern Nevada Supplemental Airport – Ivanpah Valley Site

Clark County Department of Aviation is proposing the development of a new international airport in Ivanpah Valley. In the *Clark County Conservation of Public Land and Natural Resources Act of 2002* (Public Law [PL] 107-282), "… Congress directed the Secretary of Interior, who acted through the BLM, to establish a corridor between the Las Vegas Valley and the proposed Ivanpah Valley Airport for the placement of transportation facilities and utilities[1] and to transfer an additional approximately 17,000 acres, surrounding the proposed airport site to Clark County, identified as a Noise Compatibility Area (NCA) for the proposed airport[2] after the County has satisfied the conditions for transfer that are described in PL 107-282, Section 501(c)(2). Neither the establishment of the corridor nor the transfer of the NCA shall take effect until after construction of the Airport is approved.[3] The approval referred to is associated with NEPA[4] at PL 106-362, Section 5." Although the EIS is in progress and conceptual plans are not completed, major project elements are well-defined and baseline studies have been largely completed. In June, 2010, new reports were issued stating that the

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[1] PL 107-282 at Section 501(b).

[2] PL 107-282 at Section 501(c)(1).

[3] PL 107-282 at Section 501(d).

[4] PL 91-190 (codified as amended at 42 United States Code Sections 4321-4347).

CCDOA had suspended development of this project indefinitely. Therefore, the probability of this project occurring is uncertain. However, because this is very recent information which has not been verified by BLM, the cumulative analysis assumes that the project could continue.

The airport (airport footprint) would occupy approximately 6,000 acres east of I-15, in Roach Lake Playa, between Primm and Jean, Nevada. ``Seventeen thousand acres that are largely on the bajada east, north, and south of the airport footprint have been identified as a NCA. Although such lands could undergo development for facilities that would be compatible with airport operations (air shipping companies, storage companies, etc), Clark County has indicated that the NCA would remain undeveloped. Furthermore, a portion of the 17,000-acre tract provides habitat and supports several populations of white-margined penstemon (*Penstemon albomargenatus*), a species that is being considered for listing as threatened and it is likely that such populations will require protection.

A 0.5-mile-wide Transportation Utility Corridor (TUC) would parallel the east side of I-15 and extend from the northern end of the airport footprint to the southern city limits of Las Vegas, a distance of approximately 20 miles. Facilities in the 6,400-acre TUC presently include the CalNev (Kinder Morgan) Pipeline that brings refined products from southern California to Las Vegas, segments of the Union Pacific Railroad, and two fiber optics communications lines. Tentative plans call for the addition of a Las Vegas Valley Water District water supply line, a dedicated airport access service road, and the DesertXpress rail line.

Three off-site surface water retention basins have been proposed as part of the project to control stormwater flows. The Goodsprings Retention Basin would cover a surface area of approximately 200 acres adjacent to the Desert Tortoise Translocation Area, west of I-15. The Lucy Gray Retention Basin would occupy 185 acres on the bajada northeast of the Lucy Gray Mountains. The North Retention Basin would be located near the northeastern end of the airport footprint and would total approximately 900 acres.

The loss of approximately 1,300 acres for retention basins; 6,000 acres for the airport footprint; and the use of miscellaneous lands would ultimately result in the loss of 6,787 acres of desert tortoise habitat (based on current development projections). Losses would be considerably greater if the NCA (17,000 acres) were to undergo development.

New radar/navigation aid facilities are tentatively planned near Goodsprings and near Nipton. Existing facilities on Table Mountain, at CAG/FAA, and at Nelson Cutoff (Eldorado Valley) may be modified as part of the project. Construction materials for the airport would be excavated from the retention basin sites and from a site near Jean. Approximately 10 acres have been assumed (for evaluation purposes) to be needed for each radar/navigation aid site, including access road(s). An additional 50 acres has been estimated for excavation of construction materials.

When fully constructed, the airport would occupy most of the 6,000-acre footprint and include two runways, a terminal, associated tarmac, parking, access roads, storage tanks, a control tower, and support facilities. I-15 would be modified from the airport to south Las Vegas to accommodate site access, and at least one existing high voltage transmission line (Intermountain 500-kV DC line) would be relocated.

Development of a new international airport in Ivanpah Valley, Nevada, would result in adverse visual impacts within the 6,000-acre airport footprint and access roads along I-15 as views of native desert are transformed to an industrial setting. Visual impacts would result from construction of stormwater retention basins near Goodsprings, Lucy Gray Mountains, and at the north end of the airport footprint, as well as installation of navigational aid (navaid) and radar equipment near Goodsprings. Industrialization of the valley would contribute to adverse cumulative impacts within the area.

An EIS is being prepared with an expected completion date of late 2012. If authorized, construction of the airport would begin in early 2013 and would be completed during 2017. Construction of the airport and ISEGS is not expected to be simultaneous.

Airport construction would require disturbance of more than 7,000 acres, which would increase the potential for the introduction and spread of non-native and noxious weeds. The extent of soil disturbance would be greater than that of the ISEGS and likely would contribute cumulatively to increases in non-native and noxious weeds in the area.

Development of the proposed Ivanpah Valley Airport site would contribute to night sky pollution of ambient light. Although mitigation measures (e.g., reduced light intensity and shielding) would be implemented to the extent practicable, cumulative impacts associated with the ISEGS Project would, as a whole, have far reaching consequences. It is likely that the project would contribute cumulatively with the ISEGS Project, ongoing light pollution from the Las Vegas metropolitan area, and other reasonably foreseeable future projects to affect night sky viewing at Mojave National Preserve and other public places. The project would likely contribute to an adverse cumulative impact resulting from theo degradation of night sky viewing.

Construction of the new airport in Ivanpah Valley would result in direct loss and secondary impacts to relatively undisturbed desert habitat totaling 6,787 acres. More than 7,000 acres would be permanently taken as part of airport construction, creation of surface water retention basins, radar/navaid facilities, access road improvements, and materials excavation sites. Additional lands would be impacted as a result of periodic discharge from the three retention basins. Additional analyses are needed to determine the severity of impacts that would be associated with water releases.

The airport would result in habitat fragmentation and loss of desert tortoise habitat that would contribute cumulatively to impact a species that currently is considered to be threatened as (in part) a result of habitat destruction. Avian and terrestrial species that would be jeopardized by the ISEGS project and other reasonably foreseeable future projects would be further jeopardized by the proposed airport project. Access to water that temporarily would be held at the retention basins and other areas would attract avian wildlife.

Loss of recreational lands within Ivanpah Valley, Nevada, as well lands affected by the ISEGS Project would represent a cumulatively substantial impact to recreational opportunities in the area.

Southern Nevada Regional Heliport

CCDOA plans to construct a new heliport north of Jean. The heliport and ancillary facilities (pumping station, water supply line, power line, and communications line) temporarily would disturb 331 acres; 236 acres would be permanently affected (required) for the project. The project would eliminate desert tortoise habitat and would affect other terrestrial and avian species.

New facilities would be constructed on lands adjacent to Las Vegas Boulevard that are currently unoccupied. The loss of existing desert lands would result in visual impacts to viewers from Las Vegas Boulevard and I-15. Helicopter operations likely would result in adverse noise and night sky impacts due to equipment operations and ambient glare. The magnitude of glare likely would be offset by that present from Las Vegas, Henderson, Sloan, and other sources. Some cumulative impacts from the ISEGS project and the Heliport are expected.

The project would not contribute cumulative impacts to surface or groundwater resources, soils, or geological resources.

BLM issued a Finding of No Significant Impact (FONSI) in March 2008, authorizing construction of the heliport. Although construction has been delayed and a date has not been announced, it is possible that construction would coincide with that of the ISEGS project, and that construction-related cumulative impacts could occur.

5.2 Cumulative Impact Analysis

5.2.1 Air Quality

Much of the discussion of air quality impacts in Section 4.1 is concerned with cumulative impacts. The "Existing Ambient Air Quality" subsection describes the air quality background in northeastern San Bernardino County portion of the Mojave Desert Air Basin, including a discussion of historical ambient levels for each of the assessed criteria pollutants. That section constitutes an evaluation of the cumulative impact of past and present projects on air quality. The "Construction Impacts and Mitigation" subsection in Section 4.1 discusses the project's contribution to the local existing background caused by project construction. The "Operation Impacts and Mitigation" subsection discusses the project's contribution to the local existing background caused by project operation. The following subsection includes two additional analyses:

- a summary of projections for criteria pollutants by the air district and the air district's programmatic efforts to abate such pollution;
- an analysis of the project's direct operating emissions combined with other local major emission sources;

Summary of Projections

The northeastern San Bernardino County portion of the MDAB is designated as non-attainment for both the federal and State PM10 standards, and for the State ozone standard. PM2.5, CO, NO_2, and SO_2 are all considered to be attainment or unclassified for the federal and State standards.

Ozone

Since a portion of San Bernardino County in the Mojave Desert is currently classified as non-attainment, south and west of the project site, for the federal 8-hour ozone standard, the District is required to prepare and adopt an ozone attainment plan for submittal to the EPA describing how it will achieve attainment with the federal 8hour standard. The project is not specifically subject to the provisions in the federal attainment plan and the site is outside of the non-attainment area.

Particulate Matter

The District is currently classified as nonattainment for the state and the federal 24-hour PM10 air quality standard. The District first adopted a Federal Particulate Matter Attainment Plan (PMAP) in July 31, 1995. However, some experts are critical of the federal standards as not being sufficiently health protective. California has adopted standards that are far more stringent for PM10. Currently, virtually all air districts in the state (the lone exception being Lake County) are designated nonattainment of the state PM_{10} standard. There is no legal requirement for air districts to provide plans to attain the state PM_{10} standard, so air districts have not developed such plans.

In 1997, the federal government adopted PM2.5 standards, as did the state in 2003. The EPA has determined that the area is unclassified, or attainment for both the annual and the 24-hour federal PM2.5 standard. However, the ARB classified the area as nonattainment of the annual state PM2.5 air quality standard.

The PMAP states that "(t)he air quality of the MDAQMD is impacted by both fugitive dust from local sources and occasionally by region-wide wind blown dust during moderate to high wind episodes. This region-wide or “regional” event includes contributions from both local and distant dust sources which frequently result in violations of the National Ambient Air Quality Standards (NAAQS) that are multi-district and interstate in scope." It also states that "(i)t is not feasible to implement control measures to reduce dust from regional wind events." Therefore, the District would have put considerable effort to reduce the emissions from "…unpaved road travel, construction, and local disturbed areas in the populated areas, and certain stationary sources operating in the rural Lucerne Valley."

As a solar power generation facility, the direct air pollutant emissions from power generation are negligible and the emission sources are limited to auxiliary equipment and maintenance activities. With the mitigation required by the recommended mitigation measures and District conditions, it is unlikely that the project would have an adverse impact on particulate matter emissions.

Summary of Conformance with Applicable Air Quality Plans

The applicable air quality plans do not outline any new control measures applicable to the proposed project’s operating emission sources. Therefore, compliance with existing District rules and regulations would ensure compliance with those air quality plans.

Localized Cumulative Impacts

The applicant, in consultation with the District, has conducted a survey of stationary sources that are either under construction, or have received permits to be built or operate in the near future and that have the potential for emissions of criteria air contaminants within six miles of the project site. The survey results indicate that no such sources exist within the 6-miles radius[7] of the proposed project site (CH2M Hill 2008g).

There are several proposed projects near the project site, as presented in **Table 5-2**, including the EITP project, several other renewable energy facilities (solar and wind), the Southern Nevada Supplemental Airport, a high speed train, a new commercial/residential development in Jean, and other long-term projects with minimal air quality impacts, and temporary projects with no long term air quality impacts. In general, most of these projects would create minimal long-term emissions, but construction emissions of the other renewable energy facilities, EITP, the airport, and the large development in Jean will likely have high temporary emissions from construction vehicles and fugitive dust. In the long-term, several of the developments should cause beneficial air quality impacts such as the high-speed train reducing traffic emissions on I-15, and the renewable energy projects reducing emissions associated with fossil fuel-burning power plants.

The expected daily emissions associated with overlapping construction of Ivanpah Units 1 and 2 with construction of EITP are presented in **Table 5-3**. Should construction of other solar projects in the area overlap, their emissions would likely be similar to those of ISEGS.

Table 5-3
Estimated Daily Construction Emissions of Criteria Pollutants for ISEGS and EITP

ISEGS Solar Facility Construction	Daily Emissions (lbs/day) [a]					
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Maximum Daily Emissions (assumes overlap of units)	588	7.6	643	81	383	95.7
EITP Maximum Daily Emissions	532	2.1	277	62	619	NA
Total Daily Emissions	1120	9.7	920	143	1002	NA

Source: AFC (CH2M Hill 2007), Data Responses (CH2M Hill 2008f), and EITP DEIS
Notes:
a. Emissions include fugitive dust.

Although construction of each of the reasonably foreseeable future projects would have associated emissions, the required mitigation measures to minimize these emissions would likely be similar for each project, and would ensure that no air quality NAAQS are exceeded. Mitigation Measures **AQ-SC1** and **AQ-SC-7** describe best practices for the construction and operation of the ISEGS desert solar project.

For operations, the EITP and other solar projects in the local area (which are all photovoltaic) would have minimal emissions. Therefore, these projects would not cumulatively add to the direct impacts for ISEGS, which would be mitigated by the Energy Commission staff's proposed Conditions of Certification and the District's permit conditions.

No adverse cumulative air quality impacts are expected after implementation of the Mitigation Measures. Mitigation Measures **AQ-SC1** and **AQ-SC-7** as best practices for the construction and operation of the ISEGS desert solar project.

Alternatives

Similar to the proposed project, both the Mitigated Ivanpah 3 and Modified I-15 Alternatives would generate fugitive dust and vehicle emissions during construction and emissions from the burning of natural gas and operation of maintenance vehicles during operations. The magnitude of these emissions both alternatives would be approximately the same as that for the proposed project, and in approximately the same location. Therefore, the emissions from the alternatives, combined with construction and operations emissions from the past, present, and reasonably foreseeable future projects, would likely contribute to an adverse cumulative impact on air quality. Mitigation measures described for the proposed project would also be applied to the alternatives, and would also likely be applied to future foreseeable projects. These measures would thus reduce the contribution of the project to potential cumulative impacts.

The No Action Alternative would not contribute any emissions to the existing or future conditions.

Summary

The existing condition of air quality that exists today is that the northeastern San Bernardino County portion of the MDAB is designated as non-attainment for both the federal and State PM10 standards, and for the State ozone standard. PM2.5, CO, NO_2, and SO_2 are all considered to be attainment or unclassified for the federal and State standards.

The impact to this baseline from the reasonably foreseeable future projects would be the contribution of additional emissions to the already impacted baseline condition. By generating fugitive dust, vehicle emissions, and natural gas emissions, the ISEGS project would contribute incrementally to that expected future increase in emissions. Because their emissions would be similar, the contribution of the Mitigated Ivanpah 3 and Modified I-15 Alternatives to this cumulative impact would be similar to each other, and to those of the proposed project. However, the No Action Alternative would not contribute to any potential adverse cumulative impact.

5.2.2 Greenhouse Gases

The entire assessment of greenhouse gas emissions in Section 4.2 constitutes a cumulative impact assessment. The proposed project, Mitigated Ivanpah 3 Alternative, and modified I-15 Alternative would emit greenhouse gases, and would also potentially displace greenhouse gas emissions from electricity generation from fossil fuel-based sources. However, neither these emissions, nor the displacement of other emissions, would alone be sufficient to adversely or beneficially impact global climate. Therefore, the evaluation presented in Section 4.2 has been analyzed as a potential cumulative impact in the context of existing GHG regulatory requirements and GHG energy policies.

5.2.3 Biological Resources

Past and current actions have reduced and degraded the plant communities and wildlife habitat within the Ivanpah Valley, and the proposed project would substantially contribute to the loss of biological resources and genetic diversity of special-status species within the valley. Given the project's location on a large portion of the Ivanpah Valley, and in particular, the bajada and alluvial fans that support special-status plant species, it is reasonable to assume that a substantial portion of the suitable habitat for these plants would be affected by construction of the ISEGS project, increasing the threat of local extirpation of the Ivanpah Valley proportion of these species' ranges. The project, combined with future proposed projects, would also adversely affect the population of desert tortoise within the Northeastern Mojave Recovery Unit that occurs in the Ivanpah Valley (Murphy et al. 2007, USFWS 2008a).

Geographic Scope

Cumulative construction impacts to biological resources from ISEGS would be temporary and would require coincidental construction of other large-scale projects within the geographic range of specific species. Long-term cumulative impacts from Project operations would affect biological resources due to habitat loss at various disassociated locations. The geographic range of cumulative impacts associated with ISEGS is largely limited to Ivanpah Valley, California, and Ivanpah Valley, Nevada, due to surrounding mountains.

Past and Present Conditions

Ivanpah Valley California and Nevada has undergone development since the early 1800s, which has resulted in habitat loss and fragmentation. Linear features, such as the San Pedro Los Angeles and Salt Lake Railroad (currently the Union Pacific Railroad [UPRR]) was completed in 1905 and the Arrowhead Trail Highway (currently I-15) effectively have fragmented habitat and eliminated the movement of terrestrial wildlife from major sections of the valley. Development within the area includes population centers of Nipton, Primm, Goodsprings, Jean, and Sloan. Commercial and industrial development includes casinos and retail facilities in Primm and Jean and the Bighorn Generating Facility west of Primm, and the Southern Nevada Correctional Center and the Jean Regional Airport in Jean. Approximately 3,500 acres within Ivanpah Valley, California, and Ivanpah Valley, Nevada, have been developed.

Reasonably Foreseeable Future Conditions

Cumulative impacts associated with construction of the ISEGS would include those related to the Eldorado – Ivanpah Transmission Line, as well as concurrent construction of ISEGS with other solar projects in the area. The ISEGS would eliminate terrestrial habitat for most species within a 3,564- to 4,073-acre area (depending upon alternative). Similar, but temporary, habitat losses would result from construction of the transmission line. Both projects would result in habitat fragmentation, which is exacerbated by the presence of the UPRR and I-15 that effectively block the migration of terrestrial species from east to west. Fragmentation could be exacerbated in a similar manner by the DsertXpress line. ISEGS would result in permanent habitat fragmentation and loss; effects from transmission line construction would result in temporary habitat fragmentation and loss.

As shown in **Table 5-4**, construction and operation of the ISEGS, Stateline Solar, DesertXpress, NextLight Solar, the Southern Nevada Supplemental Airport, and the Southern Nevada Regional Heliport, would result in an increase of developed land in the local area from the current 3,500 acres to approximately 30,000 acres. Of this additional 26,500 acres, most (approximately 26,000 acres) would comprise habitat for desert tortoise and other wildlife and vegetation species. A small portion of this new development (approximately 613 acres) comprises a portion of the Southern Nevada Supplemental Airport that would be located on portions of Jean/Roach Dry Lake that are not considered to be habitat. Additional existing and proposed land uses potentially impact habitat for desert tortoise and other species, but not to the extent of the impact presented by the solar and airport facilities. For instance, the 224,931-acre Jean/Roach Dry Lake SRMA likely has an impact on wildlife and vegetation species due to off-road vehicle use. However, this impact is not expected to be as severe as the removal, grading, and fencing of areas required for the solar and airport developments.

These developments would create long-term adverse impacts to biological resources in the area. ISEGS would eliminate the vegetation and wildlife habitat covering an area of 3,564 to 4,073 acres, depending upon alternative; Stateline Solar, DesertXpress, NextLight, the Southern Nevada Supplemental Airport, and the Southern Nevada Regional Heliport would result in the elimination of an additional 22,068 acres of vegetation and wildlife habitat. Therefore, construction of the ISEGS would represent approximately 16 percent of the habitat impacts associated with reasonably foreseeable future projects within the area.

Table 5.4
Habitat Disturbance for ISEGS and Reasonably Foreseeable Future Projects

Project	Total Acres of Habitat	Percent of Current Development	Percent of Total Foreseeable Development
ISEGS	3,564 – 4,073	100 – 120	13
Eldorado – Ivanpah Transmission Line Upgrade	373	10	1
Stateline Solar	4,168	120	14
DesertXpress	2,424	70	8
NextLight Solar	7,840	224	27
Southern Nevada Supplemental Airport	7,400	211	25
Southern Nevada Regional Heliport	236	7	1
Current Development	3,500	---	12
Total	29,505 – 30,014	---	---

Construction and operation of ISEGS, Stateline Solar, NextLight Solar, and the Southern Nevada Supplemental Airport would reduce foraging habitat for the Pallid bat, Townsend's big-eared bat, and golden eagle. Foraging and nesting habitat also would be reduced for Bendire's Thrasher. Cumulative impacts to Nelson's bighorn sheep would result from ISEGS, the Stateline Solar, NextLight Solar, portions of the Southern Nevada Supplemental Airport project, and (possibly) the Southern Nevada Regional Heliport. The proposed project and other action alternatives would affect 3,196 to 4,073 acres; cumulative impacts would total 22,227 to 23,104 acres. Long-legged myotis, western burrowing owl, and gray vireo are not known to be present at the ISEGS Project site and would not contribute to cumulative impacts to the species.

Construction of the ISEGS would eliminate 3,196 to 4,073 acres (depending upon alternative) of habitat that would be used by migratory bird species (see Section 4.3 for list of species) and the desert tortoise. When combined with habitat losses associated with the other reasonably foreseeable future projects (solar projects and the Southern Nevada Supplemental Airport), cumulative habitat losses would total 22,227 to 23,104 acres.

Potential impacts to the gila monster that would result from construction or operation of ISEGS or reasonably foreseeable future projects would be minimal. Those projects that would have the greatest possibility of attributing cumulatively to impacting the species are largely limited to project areas within rocky terrain of the proposed ISEGS project, Stateline Solar, and NextLight Solar. Because these projects are located primarily on the bajadas, each is expected to impact little, if any, terrain that would provide habitat for gila monsters. The DesertXpress, the Southern Nevada Supplemental Airport, and the Southern Nevada Regional Heliport would be largely located within lower alluvial fans and playa floors, which do not provide habitat for the species.

Alternatives

Construction of the proposed ISEGS Alternative would result in greater impacts to biological resources than would occur as a result of construction of the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative because most of the 4,073-acre project site would be made up of high quality habitat. Reduced project size that is proposed for the Mitigated Ivanpah 3 Alternative would eliminate 433 acres of good quality habitat, thus approximately 3,564 acres would be affected. The Modified I-15 Alternative would include construction within proximity to I-15 and on the playa lake lakebed. Approximately 30 percent (368 acres) of the 1,227-acre Unit 3 Modified I-15 Alternative previously has been impacted by I-15 or is within the playa floor and does not support suitable biological habitat. Therefore, cumulative impacts associated with the proposed project would be greater than those of either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative.

The No Action Alternative would not contribute to the cumulative impacts to vegetation and wildlife habitat.

Summary

The existing condition of biological resources that exists in the Ivanpah Valley area today is that habitat for wildlife and vegetation have been removed and/or fragmented due to human development, including the Primm Casinos, Primm Valley Golf Course, I-15 and other roads, recreational activities, and various transmission lines and pipelines.

The impact to this baseline from the reasonably foreseeable future projects is that additional habitat degradation and fragmentation is expected to occur, with cumulative habitat losses totaling 22,227 to 23,104 acres. Of this total, the proposed ISEGS project would contribute an additional 4,073 acres of habitat disturbance. Loss of 4,073 acres of habitat due to the ISEGS project would contribute to the cumulative loss of Ivanpah Valley's native Mojave Desert plant and wildlife communities, including the threatened desert tortoise and other special-status species. The impact to the baseline from the Mitigated Ivanpah 3 Alternative, in combination with the reasonably foreseeable future projects, would be lower than that for the proposed project, due to the reduction in acreage to 3,564 acres, and the movement of the northern boundary of the facility further from the Clark Mountain Range. Implementation of the Modified I-15 Alternative would reduce these cumulative impacts even further by replacing the use of high quality habitat in the current Ivanpah Unit 3 location with lower quality habitat adjacent to I-15. These adverse cumulative impacts to desert tortoise habitat may be avoided or minimized with appropriate levels of compensatory mitigation, as discussed in Mitigation Measure **BIO-17**. However, the No Action Alternative would not contribute to any potential adverse cumulative impact.

5.2.4 Cultural Resources

Cumulative impacts would occur locally if ISEGS project impacts combined with the impacts of projects located within the Ivanpah Valley. Therefore the geographic extent for the analysis of *local* cumulative impacts is defined as the Ivanpah Valley. The proximity of cultural resources to the ISEGS project would be of interest only to the extent that such proximity would considerably affect the context or integrity of cultural resources. This geographic scope is appropriate because it is likely that cultural resources similar to those in the ISEGS project area of analysis are present throughout this area.

The construction, operation, maintenance, closure, and decommissioning of a number of projects presently proposed and under consideration in the Ivanpah Valley area would result in an adverse cumulative impact on at least one known historical resource, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), and may further effect other cultural resources of the types now known for the ISEGS project area. The proposed project, along with the effect of the EITP project discussed above, which is the proposed reconstruction by the SCE of approximately 36 miles of the Eldorado leg of the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass transmission line, the line which now includes the remaining portion of the original Hoover Dam-to-San Bernardino transmission line, would contribute to an adverse cumulative impact, and the effect of the subject reconstruction on CA-SBR-10315H would be adverse. The subject reconstruction would entail one portion of the Eldorado leg being removed from the proposed project area approximately northeast to the Eldorado Substation. The original proposal of the California ISO was to reconstruct the removed portion of the line to facilitate a higher transmission capacity of 220 kV (CH2M Hill 2008c, pp. ii–iii). There appears to be other plans to modify the Hoover Dam-to-San

Bernardino line, through the project area. The applicant has related that SCE also plans to remove the portion of the transmission line from the project area southwest to the Mountain Pass Substation and to replace it with two, double-circuit, 115-kV pole lines (CH2M Hill 2008n, p. 6). Given that the California ISO assigns approximately 400 MW of the approximately 1,900-MW capacity of the modified transmission line to the proposed project, the contribution of the proposed project to the partial destruction of the Hoover Dam-to-San Bernardino transmission line would be approximately 21 percent.

BLM proposes to offset this adverse impact of the proposed transmission line reconstruction on CA-SBR-10315H through the implementation of Mitigation Measures **CUL-8** and **CUL-9**, measures which are expected to be appropriate to the scale and character of the effect of the proposed project on the subject historical resource. The mitigation proposed in measures **CUL-8** and **CUL-9** would consist of the Historic American Engineering Record (HAER) recordation of the tower types and the cabling system of the portion of the Hoover Dam-to-San Bernardino transmission line that traverses the project area. While the proposed mitigation would result in the recordation of less than the approximate 21 percent share of the destruction to which the proposed project would contribute, the scope of the mitigation reasonably takes into account the likelihood that the historical resource would undergo HAER recordation as a result of the NEPA analysis that the BLM would conduct in conjunction with its planning for and authorization of SCE's modifications to the Hoover Dam-to-San Bernardino transmission line. The mitigation would also be sufficient to compensate for any modifications to the line that would be necessary to accommodate only the proposed project if SCE were to downgrade the scale of the modifications to the line to take into account any of the other presently proposed projects withdrawing from the California ISO queue.

The construction of other projects in the same vicinity as the proposed project could affect *unknown* cultural resources of the types that the ISEGS project would affect. A large number of other projects are proposed and under consideration in the Ivanpah Valley area, and many would involve ground disturbance and visual intrusion. For example, the FirstSolar Stateline project would involve ground disturbance across 4,160 acres of land adjacent to the project site, and construction of the Southern Nevada Supplemental Airport would disturb 5,934 more acres. The use of the 17,000-acre Noise Compatibility Area is unknown, but this area could also be developed, and resources disturbed. Therefore, it appears that the ISEGS project does have the potential to contribute to a cumulative impact in the Ivanpah Valley. However, project proponents for other future projects in the area may be able to avoid causing substantial adverse changes to NRHP-eligible cultural resources through deliberate project planning, or avoid or reduce such impacts to presently unknown cultural resources by implementing mitigation measures requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for resources evaluated to be NRHP-eligible. Such avoidance or mitigation of potentially adverse impacts to presently unknown cultural resources would render the potential contribution of the ISEGS project to cumulative impacts on such resources negligible.

Unknown, unrecorded cultural resources may be found at nearly any development site. As they are discovered, resources are recorded and information retrieved. If the nature of the resource requires it, the resource is protected. When discovered, cultural resources are treated in accordance with applicable federal and state laws and regulations as well as in compliance with the mitigation measures and permit requirements applicable to a project. It is not known what cultural resources, if any, would be affected by development of all present and future projects within the Ivanpah Valley, however, it is reasonable to assume that cultural resources exist and could be expected to be uncovered at some of these sites. As would be done during ISEGS construction, should resources be discovered during the construction of current and future projects, they would be subject to legal requirements designed to protect them, thereby reducing the effect of impacts. Therefore ISEGS impacts, when combined with impacts from past, present and reasonably foreseeable projects would not cause adverse cumulative impacts to presently unknown cultural resources.

Alternatives

Because no direct or indirect impacts to cultural resources would be associated with either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts to these resources. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.5 Hazardous Materials Management

The potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed ISEGS with other existing or foreseeable nearby facilities, as listed in **Tables 5-1** and **5-2**, was evaluated. Because of the small amounts of the hazardous chemicals to be stored at the facility, there would be no possibility of producing an offsite impact. Also, because no nearby facilities use large amounts of hazardous chemicals, there is little (if any) possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a threat. It is unlikely that wastes generated or released at the ISEGS project site would be transported (by wind or surface waters) across intervening mountain ranges.

Alternatives

Because no direct or indirect impacts associated with hazardous materials would result from either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts resulting from hazardous materials management. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.6 Land Use

Ivanpah Valley, Nevada, and to a lesser extent, Ivanpah Valley, California, have undergone development since the 1800s. Population centers in the area include State Line (renamed as Primm), Jean, Sloan, Goodsprings, and Nipton. Commercial and industrial facilities include casinos in Primm and Jean; retail facilities in Primm, Jean, and Goodsprings; and industrial facilities in Jean and west of Primm. The Southern Nevada Correctional Facility and South Clark County Regional Airport are located near Jean. Primm Golf Course is located in Ivanpah Valley, California. Undeveloped lands currently are used for recreational purposes, including organized off-road racing in Nevada. Overall, approximately 5 square miles (3,500 acres) have been developed within the valleys. Additional lands that have been affected by development include mine sites, utility ROWs, I-15, and the UPRR.

Development of the ISEGS, Stateline Solar, DesertXpress, NextLight Solar, the Southern Nevada Supplemental Airport, and the Southern Nevada Regional Heliport would permanently impact 25,632 to 26,141 acres (40 to 41 square miles) within Ivanpah Valley, California and Nevada (see **Table 5-4**). An additional undetermined amount of land would be temporarily impacted as part of project development. Lands occupied by the ISEGS project (regardless of alternative) would represent approximately 100 to 120 percent of those that currently are developed or 13 percent of those that would be developed in the foreseeable future.

The ISEGS project area would cover portions of Utility Corridors D and BB. To protect the public interest, BLM must optimize the use of utility corridors to best accommodate multiple existing and future projects, minimize adverse environmental impacts, and minimize duplication or proliferation of similar facilities. The establishment of the ISEGS project along with other future foreseeable projects, such as the 4,160-acre FirstSolar photovoltaic project immediately east of ISEGS, could conflict with or eliminate other future uses in the designated Utility Corridors D and BB.

Development of the ISEGS project would preclude and in some cases, unduly restrict existing and future multiple uses such as recreation, wildlife habitat, livestock grazing, and open space on 4,073 acres of public land designated MUC L. Land use impacts of the ISEGS project, when combined with impacts of the other foreseeable projects which will use extensive land area (the solar projects and the Southern Nevada Supplmental Airport), would result in adverse cumulative land use impacts within the Ivanpah Valley which cannot be mitigated.

Construction of ISEGS would contribute to the cumulative modification of project area land uses from one that is dominated by open space and available for casual recreational use to an area that is industrialized. The addition of reasonably foreseeable future projects would further contribute to the industrialization of the area.

Alternatives

The contribution of the Mitigated Ivanpah 3 Alternative and the Modified I-15 Alternative to cumulative land use impacts in the Ivanpah Valley, and southern California desert in general, would be almost exactly the same as those identified for the proposed project. Although the acreage associated with these alternatives would be reduced by approximately 12.5 percent from that of the proposed project, this reduction is not so substantial that it would eliminate the magnitude of the contribution of the ISEGS facility to cumulative land use impacts. The No Action Alternative would not contribute to this reduction in available land use in the area.

Summary

The existing condition of land use that exists in the Ivanpah Valley area today is that a very small portion of the area (approximately 3,500 acres) has been developed, leaving the vast majority of the area available as wildlife and vegetation habitat, for recreational uses, or for other future development.

The impact to this baseline from the reasonably foreseeable future projects is that approximately 22,000 acres of currently undeveloped land would be developed, substantially increasing the amount of land that has been removed from other land uses in the area. The ISEGS project would add an additional 4,073 acres to this cumulative land use impact. The impact to the baseline from the Mitigated Ivanpah 3 and Modified I-15 Alternatives, in combination with the reasonably foreseeable future projects, would be approximately the same as each other, and as the proposed project, at 3,564 acres. The No Action Alternative would not contribute to this reduction in available land use in the area.

5.2.7 Noise and Vibration

Cumulative noise impacts could occur only locally because the ISEGS project impacts cannot combine with impacts of projects beyond this region. The geographic area impacted by cumulative noise impacts is generally limited to areas within approximately one-quarter mile of the ISEGS project. This area is appropriate because noise impacts would generally be localized, mainly within approximately 500 feet from any noise source; however it is possible that noise from different sources within one-quarter mile of each other could combine to create an adverse impact to receptors at any point between the projects. At distances greater than one-quarter mile, steady construction noise from the project would generally dissipate into quiet background noise levels.

Only one of the reasonably foreseeable projects identified in **Table 5-2** would be located near enough to the ISEGS project to pose a potential for cumulative noise impacts. The FirstSolar Stateline project is proposed to be located directly adjacent to the ISEGS site. The nearest sensitive receptor to the ISEGS project is the Primm Valley Golf Course, located approximately 0.5 mile northeast of the site, and one mile from the FirstSolar photovoltaic project. As discussed in Section 4.7, noise generated during construction of the ISEGS projects could reach levels of 50 to 55 dBA Leq at the Primm Valley Golf Course, but such levels are not likely to be annoying to golfers. Noise from the FirstSolar photovoltaic project could combine with noise generated by the ISEGS project. Because doubling the distance from a noise source reduces the sound pressure level by 6 dB, noise from construction of the FirstSolar project would be expected to be roughly 6 dB quieter at the golf course than noise from ISEGS. Combined construction noise from the two projects would thus reach levels of 51 to 56 dB at the golf course, an unnoticeable increase over noise from one project alone. Noise impacts of the ISEGS project would thus not combine with impacts of past, present, and reasonably foreseeable projects to result in a contribution to adverse cumulative impacts related to noise.

Alternatives

Because no direct or indirect impacts from noise and vibration would result from either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts from noise and vibration. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.8 Public Health and Safety

Cumulative impacts would occur locally if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. For purposes of the cumulative analysis, the emissions from construction or operation of the ISEGS project could potentially combine with emissions from past, present and reasonably foreseeable projects to result in adverse health effects to the public. Cumulative impacts to public health could occur as a result of implementation of the ISEGS project on both a local and regional level. The geographic extent for the analysis of local cumulative impacts associated with the ISEGS project includes the MDAB and the Ivanpah Valley Air Basin (IVAB). The shared nature of air resources warrants consideration of emissions occurring outside of the local air basin (MDAB).

Cumulative Impact Analysis

The applicant requested from the MDAQMD a list of all existing or planned emission sources (with construction permits or in the permitting process) within a 6-mile radius. The information received in response from the MDAQMD indicates that the only existing or planned emission source within six miles of the proposed project is a small existing gasoline dispensing system at the Primm Valley Golf Club. The permit for this source limits ROG/VOC emissions to 0.45 tons per year. Another emission source (the Molycorp Minerals facility) is approximately 6 miles from the proposed ISEGS, but the MDAQMD indicated that almost all equipment is located beyond the 6-mile radius (CH2ML 2008a, Attachment DR11-1). The applicant stated that due to the lack of existing or planned projects within a 6-mile radius for which emission data is available, no cumulative impact analysis would be prepared (CH2M Hill 2008g, Response to Data Requests 11 and 12). BLM has analyzed the public health and safety effects of existing and foreseeable projects listed in **Tables 5-1** and **5-2** as follows.

Local Projects

The maximum cancer risk for emissions from ISEGS is 2.9 in one million located at an isolated area in the adjacent desert with no buildings or residences nearby. The maximum impact location occurs where pollutant concentrations from ISEGS with all combustion sources operating at the same time would theoretically be the highest. Even at the maximum impact location, and in consideration of the existing natural gas-fired Bighorn Electric Generating Station, a proposed natural gas-fired Ivanpah Energy Center, both near Primm, and the proposed FirstSolar photovoltaic electric generation facility east of ISEGS, there would be no change in lifetime risk to any person. The increase does not represent any real contribution to the average lifetime cancer incidence rate due to all causes (environmental as well as life-style and genetic). Modeled facility-related residential risks are lower at more distant locations, and actual risks are expected to be much lower since worst-case estimates are based on conservative assumptions and thus overstate the true magnitude of the risk expected. Therefore, the incremental impact of the additional risk posed by the ISEGS does not present an adverse direct, indirect, or cumulative impact.

ISEGS would minimally contribute to cumulative impacts to public health and safety within Ivanpah Valley. Construction of reasonably foreseeable future projects would increase the likelihood for the release of hazardous materials and increase the potential for exposure of such materials to the public. Due to the complexity and size of the project, the proposed Southern Nevada Supplemental Airport likely would present a greater hazard to public health and safety than that of ISEGS or other reasonably foreseeable future projects. Airport operations would require the presence of de-icing chemicals, lubricants, and fuels. Containment of such substances and cleanup of incidental spills would be incorporated into airport design and minimize such occurrences. Detailed risk assessments would be needed to fully quantify the range and level of risks associated with the airport and other projects. Public health impacts of the ISEGS project would not combine with impacts of any past, present, or reasonably foreseeable projects to result in adverse cumulative impacts. Therefore, no mitigation is recommended to address potential cumulative project impacts.

Alternatives

Because no direct or indirect impacts to public health and safety would be associated with either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts to public health and safety. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.9 Socioeconomics and Environmental Justice

Cumulative impacts would occur locally if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. Cumulative impacts could also occur as a result of regional development of large-scale projects. The geographic extent of cumulative impacts related to socioeconomics includes San Bernardino County, California and Clark County, Nevada and the cities contained therein. This geographic extent is appropriate because local jurisdictions or districts provide socioeconomic factors, such as public services, and the labor force and housing market potentially impacted is expected to come primarily from within these counties.

Cumulative Impact Analysis

Local Projects

Despite the potential for construction schedule overlaps with known projects within the proposed ISEGS study area, no adverse cumulative socioeconomic effects are anticipated from either the construction or operation of the proposed ISEGS. As discussed in Section 4.9, an assumed maximum peak labor force of 959 construction workers represents 0.4 percent of the total construction workforce within the study area. Operation of the proposed ISEGS would require only 90 full-time, permanent employees, which represents a small portion of the available local labor force.

Therefore, because the proposed ISEGS requires such a small number of workers relative to the amount of available workers for both construction and operation, its contribution to socioeconomic impacts resulting from an influx of non-local workers and their dependents would not result in an adverse cumulative impact.

As shown in **Tables 5-1** and **5-2**, only one identified existing or foreseeable local project contains residential housing, a mixed-use development in Jean, Nevada (identified as Cumulative Project G in **Table 5-2**). The number of housing units associated with this project is unknown. In addition, those existing and foreseeable local projects would create job stimulus within the local area that could increase population. Large development projects such as the Southern Nevada Supplemental Airport would likely result in an increase in population and require the need for new housing and expanded public service facilities. However, as the ISEGS project would not result in any project specific adverse socioeconomic impacts, it would have no contribution to any potential local cumulative adverse socioeconomic impacts. Furthermore, because the proposed ISEGS would not result in any impacts to socioeconomic resources, it would not result in any individually minor but collectively significant actions taking place over a period of time that could result in cumulative socioeconomic impacts on a local level. In addition, the long-term payment of taxes and fees and distribution of O&M and payroll dollars is expected to have a cumulative benefit to San Bernardino County, California, and Clark County, Nevada, by increasing the amount of public funds available to the counties for community projects. The cumulative benefits would be increased when combined with the revenues accrued as a result of current and future reasonably foreseeable development projects as a result of the proposed ISEGS.

Regional Projects

Regional impacts would occur if impacts from the ISEGS combined with impacts of the projects that are currently proposed in the commuting area for the ISEGS project. Large scale renewable energy projects, such as Cogentrix Solar Services LLC: 1,000 MW solar generation facility on approximately 19,000 acres in Nevada, NextLight Renewable Power, LLC: two solar trough projects (one 200 MW project and one 500 MW project at the Nevada/California border), Ivanpah Energy Center 500 MW gas-turbine combined-cycle power plant in Primm, Nevada, and the Wind Energy power plant projects (75 MW on 2,330 acres and 50 MW on 3,360 acres) in Mountain Pass will require a large construction workforce and lengthy construction duration. Construction workers would likely commute from larger urban centers in surrounding communities during construction activities. Solar energy generation and wind energy generation facilities do not require large numbers of operational staff, therefore it is very unlikely that these projects would induce substantial growth in any of the communities in which they are proposed to be constructed. As such, these projects would be extremely unlikely to generate the need for new housing or substantially affect revenues of local businesses or agencies. In fact, construction of these facilities would likely result in increased revenues to local businesses during construction. Therefore, while large scale regional renewable energy projects will occur within the ISEGS geographic area for socioeconomic effects, as the ISEGS project would not result in any project specific adverse socioeconomic impacts it would not cumulatively contribute or combine with those of the future solar and wind development projects proposed to be constructed in desert areas of southeastern California and southern Nevada to result in adverse cumulative socioeconomic impacts. Furthermore, because the proposed ISEGS would not result in any impacts to socioeconomic resources, it would not result in any individually minor but collectively significant actions taking place over a period of time that could result in cumulative socioeconomic impacts on a regional level.

Alternatives

Because no direct or indirect adverse impacts to socioeconomics or environmental justice would be associated with either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts to these resources. The contribution of these alternatives to beneficial impacts to socioeconomics would be approximately the same as those for the proposed project. The No Action Alternative also would not contribute to any potential cumulative impacts, including the beneficial impacts associated with the proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative.

5.2.10 Soil and Water Resources

Storm Water and Sediment

Construction and operation of the proposed project, including the grading, filling, and rerouting of ephemeral streams, would disturb approximately 4,100 acres of land and increase the transport of storm water and colloidal sediment to the Ivanpah playa. Smaller scale projects previously constructed in the project vicinity include the Union Pacific railroad track, a power transmission line, Interstate Highway 15, the Nevada Energy Bighorn power plant, Molycorp evaporation ponds, the Primm Valley Golf Club, and commercial development in Primm. No adverse storm water and sediment transport impacts from these developments to the Ivanpah playa has occurred. Water management has been a concern during the planning for the Southern Nevada Supplemental Airport. Current plans call for excavation of three large off-site retention basins to control surface water inflow to the playa and Roach Lake. The basins would occupy approximately 1,300 acres and would be approximately 40-feet-deep.

The construction and operation of reasonably foreseeable projects within the project vicinity that could result in increase storm water and sediment transport impacts are listed below in **Table 5-5**. The projects most likely to contribute to stormwater and sediment impacts would be those occupying large land areas on active alluvial fans, including the planned solar projects and the Southern Nevada Supplemental Airport. However, all of these projects would be subject to existing laws and regulations and would be designed to avoid, manage, and mitigate potential storm water and sediment impacts. Likewise, the proposed project has been designed to be in compliance with existing laws and regulations and would use a storm water and sediment pass though design that would result in a minor increase of sediment downgradient of the proposed project. Also, approximately 5 square miles of Ivanpah Valley (California and Nevada) have undergone development. Although development has increased the relative amount of impervious surface within the valley and contributing watershed drainages, flooding has not been reported as a problem. Therefore, the construction and operation of the proposed ISEGS project would not result in adverse cumulative impacts to downgradient resources from erosion, storm water, or sediment aggradation or degradation.

Groundwater Consumption

A summary of reasonably foreseeable projects in the Ivanpah Valley and their potential water use is presented below in **Table 5-5.** These projects and cumulative impacts were analyzed in detail in the Regional Groundwater Supply section in Section 4.10.

Table 5-5
Large-Scale Projects under Development or Reasonably Foreseeable in the Ivanpah Valley

Potential New Groundwater Users	Estimated Water Use	
	During Construction	During Operation
Desert Xpress Rail Line A proposed high-speed rail from Victorville to Las Vegas.	Unknown (limited duration)	Negligible
Mixed-Use Development (near Jean) Demolition of the Nevada Landing Casino and redevelopment of this and adjoining land as a 166-acre master-planned community of affordable housing, commercial businesses, shops, and a new-hotel casino. This development is contingent on the construction of the new Ivanpah Valley Airport.	Unknown (limited duration)	Unknown
Ivanpah Energy Center A 500-MW, air-cooled, gas-turbine, combined-cycle power plant. Although the facility would be using up to 50 AFY of water, this water would be recycled water from the WWTP.	Unknown (limited duration)	15 AFY from an Undisclosed Groundwater Source 35 AFY from Recycled Water
Las Vegas Valley Water District Pipeline Proposed construction and operation of a water supply pipeline from the existing 2420 Zone Bermuda Reservoir (located in southern Las Vegas) to Jean, Primm, the Southern Nevada Correctional Center, and the proposed Ivanpah Valley Airport.	Unknown (limited duration)	Negligible The use of imported surface water in the Ivanpah Basin would result in additional discharges of wastewater. At least a portion of this wastewater would likely infiltrate to the groundwater basin, increasing groundwater recharge in the basin.
Southern Nevada Supplemental Airport (Ivanpah Valley Airport) The proposed airport is anticipated to use water supplied by the Las Vegas Valley Water District pipeline for both construction and operation activities	None	None
Eldorado-Ivanpah Transmission Project	Unknown (limited duration)	Negligible
Reoperation of the Molycorp Mine	Negligible	400 AFY
NextLight Silver State North and South Photovoltaic Power Plant (250-MW)	Unknown (limited duration)	Estimated 14 AFY
FirstSolar Photovoltaic Power Plant	Unknown (limited duration)	Estimated 6 to 30 AFY
Primm Outlet Mall New Fast-Food Restaurant	Negligible	Estimated at 15 AFY

Potential New Groundwater Users	Estimated Water Use	
	During Construction	During Operation
To be located adjacent to the Primm Outlet Mall		

Sources: CH2M Hill 2007; BLM.

Water supply uses during construction of Ivanpah 1, 2, and 3 would be limited in duration and quantity. The applicant estimates that the annual average water demand during construction of Ivanpah 1 and 2 would be 111 AFY, and 217 AFY for Ivanpah 3, with up to an additional 47,000 gallons used for hydrostatic testing of the projects' piping. Each power plant is estimated to take 24 months to complete.

During operation, the project would use groundwater for potable and plant processes at the rate of approximately 100 AFY. Over the next 50 years, the use of groundwater in the IVGB is expected to increase. However, the project's groundwater use would contribute only 1.8 percent to the existing and only 1.7 percent of the reasonable foreseeable cumulative pumping volume in the IVGB. Because it is such a small percentage, the project's proposed contribution to the cumulative groundwater pumping in the IVGB would not be adverse. The reasonably foreseeable groundwater use in the IVGB may increase nominally by 450 to 470 AFY. With this nominal increase, water use in the IVGB would not exceed the estimated annual recharge, and therefore, would not result in adverse long-term impacts.

Alternatives

Although project-related impacts associated with stormwater events could potentially occur, these impacts would be localized, and would not combine with similar effects from any other past, existing, or reasonably foreseeable future development. Therefore, Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative would not contribute to any cumulative impacts associated with stormwater flood events. The No Action Alternative also would not contribute to any potential cumulative impacts associated with stormwater flooding.

Both alternatives would constitute a consumptive use of groundwater in a location in close proximity to other groundwater users, specifically, the Primm Valley Golf Course. The location of the ISEGS supply wells proposed in the original application was modified, in part, to move them further from the Primm Valley Golf Course wells, and thus reduce the potential for overlapping water use conflicts. Because the amount of groundwater use is expected to be small compared to the volume of groundwater available in the basin, the Mitigated Ivanpah 3 and Modified I-15 alternatives would not contribute to any cumulative impact to groundwater availability. Monitoring of groundwater levels, as required in Mitigation Measures, would help to ensure that cumulative impacts do not occur. The No Action Alternative would not use groundwater, so would also not contribute to any potential cumulative impacts to groundwater resources.

5.2.11 Traffic and Transportation

Cumulative impacts can occur if implementation of the ISEGS project could combine with those of other local or regional projects. Cumulative impacts would occur locally if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. Cumulative impacts could occur to both the local roadway network and the regional roadway network. Local impacts are impacts that would occur to the transportation system in the immediate vicinity of the project site, such as damage to local roadways, traffic delays due to road closures, and increased congestion from project-related traffic. Cumulative impacts to the local roadway network would occur if project impacts combined with impacts of projects located within the same general vicinity of the ISEGS site. Therefore, the analysis of cumulative traffic and transportation impacts is evaluated for the local roadway network, defined as the area up to two miles from the ISEGS project site.

Cumulative impacts could also affect the regional roadway network, based on potential impacts that would occur to I-15. Primary access to the project site would be provided via I-15, which is an interstate highway that connects Los Angeles, California to Las Vegas, Nevada, as well as California to Nevada, Utah, Idaho, and Montana. Existing traffic on I-15 is mostly attributable to commuter, commercial, and tourist traffic that originates from well beyond the project area, such as Las Vegas, Nevada; Barstow, California; Victorville, California; and Los Angeles, California. However, a comprehensive analysis of traffic generated by projects in such distant locations is beyond the scope of this analysis. Therefore, the geographic extent for the analysis of cumulative traffic and transportation impacts to the regional roadway network is defined as the area up to 30 miles from the project.

Local Impacts

Construction related commuter traffic and equipment deliveries for the ISEGS project would generate up to 243 additional daily trips to roadways in the immediate vicinity of the site (Yates Well Road, Coliseum Road, and the I-15 (regional impacts to I-15 are discussed below) on- and off-ramps located at Yates Well Road) throughout the 48-month construction period. The addition of these trips to local roadways would not result in adverse impacts with respect to delays to local traffic, congestion, roadway hazards, and damage to roadways. Only one of the foreseeable projects presented on **Table 5-2**, the FirstSolar photovoltaic project, has the potential to add traffic to the same local roadways as the ISEGS project. Although the environmental review process has not yet begun for the FirstSolar photovoltaic project and there is currently no publicly available information regarding the potential construction schedule of this project, because construction of the ISEGS project would be ongoing for approximately four years, it is likely that there would be at least some overlap between the construction schedules of the two projects.

There is currently no available data regarding construction traffic of the proposed FirstSolar project, however, it is reasonable to assume that this project would require a level of workforce and equipment deliveries roughly equal to that of the ISEGS project. Due to the extremely low volume of traffic on Yates Well and Colosseum Roads, the combined effect of traffic from the ISEGS and FirstSolar projects would be unlikely to result in adverse impacts related to congestion and level of service of these roadways. The combined effect of traffic from both projects would likely increase the potential for damage to these roadways; however, similar to Mitigation Measure **TRANS-4**, it is assumed that the FirstSolar project would be required to repair any damaged roadways attributable to the FirstSolar project. Therefore, impacts of the ISEGS project are not expected to combine with impacts from the FirstSolar photovoltaic project to result in adverse cumulative impacts to local roadways.

Regional Impacts

Several projects presented on **Table 5-2** with the potential to result in increased congestion on I-15 are located within 15 miles of the ISEGS project. Projects that have the potential to be under construction at the same time as the ISEGS are the Southern Nevada Supplemental Airport, the Desert Xpress Train, the FirstSolar photovoltaic project, and the Caltrans Joint Port of Entry projects. Construction of each of these projects would result in increased vehicle trips on I-15. It is highly likely that some, if not all of these projects would result in additional vehicle trips on northbound I-15 on Friday afternoons. Additionally, because it is proposed to facilitate tourist travel to Las Vegas, operation of the Southern Nevada Supplemental Airport would likely result in a substantial increase in vehicle traffic on northbound I-15 on Friday afternoons.

I-15 currently operates at a congested level of service (LOS F) on Friday afternoons due to the high volume of commuter and tourist traffic traveling from California to Las Vegas, Nevada. Although implementation of **TRANS-1** would reduce the congestive effects of ISEGS-related traffic on I-15 at the Yates Well Road on-ramp, implementation of the project would still add an additional 227 vehicles to I-15 on Friday afternoons. The above referenced cumulative projects would also result in the addition of vehicles to northbound I-15 on Friday afternoons. While some projects would contribute a higher number of additional trips to I-15 than others, the combined effect of additional traffic from all of the identified cumulative projects would cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of I-15. The existing congestion on northbound I-15 on Friday afternoons would be exacerbated, and is therefore considered to be an adverse cumulative impact. No additional mitigation measures are available to avoid or reduce the ISEGS project's contribution to this adverse cumulative impact.

It should be emphasized that the adverse cumulative impact identified above is the result of the *combined effects* of existing conditions, ISEGS traffic, and traffic from the cumulative projects listed above (Southern Nevada Supplemental Airport, the Desert Xpress Train, the FirstSolar photovoltaic project) throughout the 30-mile geographic extent of cumulative impacts; whereas the direct ISEGS project impact identified in Section 4.11 only considers the effect of ISEGS traffic on existing conditions in the immediate vicinity of the proposed project. This cumulative effect is related to increased traffic and public safety concerns resulting from the combined congestive effect to northbound traffic on Friday afternoons.

The Applicant indicated that "other published reports" indicate that traffic on I-15 peaks at midnight on Friday and again noon on Saturday and suggested that if this is true, then dayshift traffic leaving project site would not contribute adversely to the most congested peak period. The Applicant also noted that it is important to consider that the peak condition is seasonal, with the greatest impact in August and much less in January. The Applicant concluded that "when the LOS condition is accurately described, the LOS condition on eastbound I-15 at 5:00 p.m. on Friday may not be "F" for most, if not all of the year".

It should be noted that the "other published report" cited by the Applicant's is dated 1999. Per industry standards, impact analysis is conducted in consideration of the most recently available data. Traffic volumes cited in this EIS were collected in 2006 and 2007 and are considered to be more representative of current conditions than data from 1999. Furthermore, the applicant has acknowledged in its AFC that I-15 operates at LOS F on Friday afternoons, at which time proposed construction activities would conclude and when construction workers would begin commuting from the project site. Therefore, according to data prepared by the Applicant and verified by Caltrans, the proposed project construction would result in the addition of traffic trips to a roadway at a time that the roadway operates at LOS F.

With regard to seasonal traffic flows, the analysis presented in Section 4.11 represents a "worst-case" scenario to ensure that impacts are not understated. For example, although the number of construction workers traveling to the project site would fluctuate throughout the overall construction period, the analysis addressed the number of workers that would travel to the site during peak construction. Similarly, while I-15 may not operate at LOS F every Friday of the year, according to the 2007 Annual Traffic Report prepared by the Nevada Department of Transportation (NDOT 2007), traffic volumes on I-15 in the vicinity of the California / Nevada state line exceeded the annual average daily traffic from April through August, and exceeded 94% of the annual average daily traffic volume in February, March, September, November and December. Therefore, although northbound I-15 may not operate at LOS F every Friday of the year, it is reasonable to assume that it operates at LOS F on most Fridays.

Traffic and transportation impacts of the ISEGS project would not combine with impacts of any past, present, or reasonably foreseeable projects to result in adverse cumulative impacts to local streets in the immediate vicinity of the ISEGS project site. However, traffic and transportation impacts of the ISEGS project would combine with impacts of past, present, or reasonably foreseeable projects to result in adverse impacts to traffic on northbound I-15.

Alternatives

The contribution of the Mitigated Ivanpah 3 and Modified I-15 Alternatives to cumulative impacts on LOS on I-15 on Friday afternoons would be approximately the same as those of the proposed project. Although the duration of cumulative impacts associated with construction and decommissioning would be reduced in the alternatives, the impacts associated with operations would be the same for both alternatives. The No Action Alternative would not contribute to any potential cumulative impacts.

Summary

The existing condition of traffic that exists today is that there is no impact to services on local roads. However, I-15 currently operates at a congested level of service (LOS F) on Friday afternoons due to the high volume of commuter and tourist traffic traveling from California to Las Vegas, Nevada.

The impact to this baseline from the reasonably foreseeable future projects would be the contribution of additional traffic to I-15, including during the Friday afternoon period when traffic is already impacted. The ISEGS project would contribute incrementally to that impact, due to worker traffic during construction and operations. Because their workforce sizes would be similar, the contribution of the Mitigated Ivanpah 3 and Modified I-15 Alternatives to this cumulative impact would be similar to each other, and to those of the proposed project. The No Action Alternative would not contribute to this cumulative impact to traffic on I-15.

5.2.12 Transmission Line Safety and Nuisance

The analysis of cumulative impacts related to transmission line operation considered the potential for impacts due to field and non-field impacts from the proposed ISEGS with other existing or foreseeable nearby facilities as listed in **Tables 5-1** and **5-2**. Numerous high voltage transmission lines extend through Ivanpah Valley from the Bighorn Generating Facility (west of Primm) and substations in Eldorado Valley and Hoover Dam to southern California and other localities. The evaluation of cumulative impacts has been limited to address continued service along those lines and impacts of reconstruction of the Eldorado – Ivanpah Transmission Line. Many existing high voltage transmission lines that extend through Ivanpah Valley have been in operation since construction of Boulder (Hoover) Dam. They include several high capacity, high voltage lines that are constructed on large lattice structures. Lower voltage (230-kV) lines originate at Bighorn Generating Station and extend to Arden Substation (southern Las Vegas) and Pahrump. The recently constructed Intermountain 500-kV Direct Current Transmission Line extends across a portion of the Ivanpah Playa (Nevada), near the proposed Southern Nevada Supplemental Airport site. At the present time, it appears that all existing transmission lines (including the Eldorado – Ivanpah Transmission Line), except the Intermountain Line, would remain along current alignments.

When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since the proposed project transmission lines would be designed, built, and operated according to applicable field-reducing SCE guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Mitigation Measure **TLSN-2**. Therefore, there would not be any contribution by ISEGS to a field or non-field impact of electric power lines.

Alternatives

Because no direct or indirect impacts resulting from transmission line safety and nuisance would be associated with either the Mitigated Ivanpah 3 Alternative or the

Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts resulting from transmission lines. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.13 Visual Resources

ISEGS and Past Projects

Past and present projects in the Ivanpah Valley were analyzed in the evaluation of the existing project setting in Section 4.13. To summarize that analysis briefly, the existing Ivanpah Valley setting, though the site of existing development, is considered to be predominantly intact scenically, and was assigned a moderate overall level of visual sensitivity. Cumulative effects of past projects in combination with ISEGS are thus as described in Section 4.13. Past projects that have resulted in similar impacts in this area include the existing railroad track, the Primm Valley Golf Course, a transmission line, the I-15 freeway, the Bighorn electric generating station, Chevron-Texaco evaporation pond and commercial development in Primm, NV.

ISEGS and Foreseeable Future Projects

Table 5-2 lists foreseeable future projects within the Ivanpah Valley. All of the projects listed in **Table 5-2**, with the exception of the mixed-use development near Jean, Nevada, and the two wind energy projects on Mountain Pass, would lie within the viewshed of the ISEGS project. The Southern Nevada Supplemental Airport would be located at a sufficiently great distance as to have limited visual interaction with the ISEGS project. On the other hand, the ISEGS, Stateline, and Nextlight Silver State solar projects, the EITP and other transmission lines, along with the existing Bighorn Generating Station, proposed Ivanpah Energy Project, and City of Primm, would simultaneously be visible within middle-ground distance to I-15 motorists, and also be cumulatively dominant from viewpoints in the Clark Mountains, including KOP 10, within the Mojave National Preserve. This cumulative effect would be substantially more adverse than the adverse impacts of the ISEGS project alone, or the future projects without ISEGS, both from I-15 and from the Preserve.

For I-15 motorists the cumulative effect of the existing Primm Valley Golf Course together with the ISEGS, Joint Port of Entry, and Desert Xpress projects would be substantially adverse, converting the majority of the western highway frontage within the valley to a more urbanized, developed foreground view with potential to intrude into scenic westward highway views of the Clark Mountains. BLM does not have detailed plans of the Port of Entry Project. However, if it is of a scale and character similar to other like facilities, that project could be of considerable scale and visual effect, including not only the port structures themselves, but a large area of additional lanes and other paving, numerous trucks, and bright night lighting. Regarding the Desert Xpress project, although the specific technology that would be utilized is not known, the most common High Speed Rail technologies in current use require continuous above-ground catenary power lines that are highly urban in character, similar to light rail systems, as well as continuous safety fencing and other ancillary project features. If a final alignment paralleling the edge of I-15 were to be selected, these continuous vertical and linear features could intrude into the foreground of views of Clark Mountain as seen from the highway. Other foreseeable projects include the proposed natural gas-fired combined cycle Ivanpah Energy Center Project, which would be prominent from the highway; and most importantly, two additional solar projects, which like ISEGS would be extensive in area, adding substantially to the amount of development in the valley as seen from I-15 and the Clark Mountains. These projects, taken together, would result in a marked transformation of the existing Ivanpah Valley landscape into a more urbanized visual setting, particularly as seen by I-15 motorists in the northern portion of the valley in the vicinity of the ISEGS project. In addition, there would be some likelihood of cumulative light pollution impacts due to an accumulation of night-time light sources, including the ISEGS aircraft lighting, Joint Port of Entry, and new and existing power plant lighting.

In the EITP Draft EIS/EIR, BLM determined that EITP construction would likely overlap with that of Ivanpah SEGS, DesertXpress, NextLight Solar, and potentially the FirstSolar and Calnev pipeline expansion projects. The coincidence of these construction projects within the same viewshed at the same time would introduce new color, texture, and lines in the viewshed that would be considered an adverse impact to visual resources. The operation of all of these projects would also permanently alter the existing landscape, as seen from numerous KOPs.

The anticipated visual impacts of the ISEGS project in combination with foreseeable future local projects in the Ivanpah Valley are thus considered to present an adverse cumulative impact.

Alternatives

In general, the contribution of the Mitigated Ivanpah 3 Alternative to cumulative impacts to visual resources would be lower than those associated with the proposed project. This contribution would be reduced because of the reduction in the number of power towers from seven to three, the reduction in the size of the heliostat fields, and the placement of the northern boundary of Ivanpah Unit 3 in a location further away from sensitive receptors in the Mojave National Preserve. However, the overall conclusion that the project would contribute incrementally to an increase in the industrial character of the area would remain the same for the Mitigated Ivanpah 3 Alternative.

The contribution of the Modified I-15 Alternative to cumulative impacts to visual resources would be slightly different than that of the proposed project and the Mitigated Ivanpah 3 Alternative. Similar to the Mitigated Ivanpah 3 Alternative, the reduction of the number of power towers and heliostats would reduce the visual impacts below that associated with the proposed project. Also, by entirely eliminating the proposed Ivanpah Unit 3 location, the northern boundary of the facility would be placed even further from sensitive viewers in the Mojave National Preserve than in the Mitigated Ivanpah 3 Alternative. However, the reconfiguration of Ivanpah Unit 3 four miles to the south would result in an increase in the magnitude of impacts to viewers on I-15. Also, the overall conclusion that the project would contribute incrementally to an increase in the industrial character of the area would remain the same for the Modified I-15 Alternative.

The No Action Alternative would not contribute to any potential cumulative impacts to visual resources.

Summary

The existing condition of visual resources that exists today is that the area is considered to be predominantly intact scenically, and was assigned a moderate overall level of visual sensitivity. The viewscape currently includes the Bighorn Generating Station, Primm Casinos, and transmission lines.

The impact to this baseline from the Stateline and Nextlight Silver State solar projects and the EITP transmission line is that each of these projects would simultaneously be visible within middle-ground distance to I-15 motorists, and also be cumulatively dominant from viewpoints in the Clark Mountains, including KOP 10, within the Mojave National Preserve. This cumulative effect would be substantially more adverse than the adverse impacts of the ISEGS project alone, or the future projects without ISEGS, both from I-15 and from the Preserve.

The impact to the baseline, coupled with the reasonably foreseeable future projects, of the Mitigated Ivanpah 3 Alternative, would be slightly lower than that associated with the proposed project. This is because of the reduction in the number of power towers and heliostats, as well as the placement of the northern boundary of the facility further from the Mojave National Preserve. The contribution to the impact resulting from the Modified I-15 Alternative may be greater than that of the proposed project and Mitigated Ivanpah 3 Alternative, due to the placement of heliostats directly along I-15 for a distance of 1.8 miles. The No Action Alternative would not result in an increase in the industrial character of the area, so would not contribute to the adverse cumulative visual impact in the area.

5.2.14 Waste Management

The geographic extent for the analysis of the cumulative waste management impacts associated with the ISEGS includes San Bernardino County, California and Clark County, Nevada. This geographic scope is appropriate because waste generated by the ISEGS would be disposed of in one or both of these counties.

The ISEGS would generate nonhazardous solid waste that would add to the total waste generated in San Bernardino County, California and Clark County, Nevada. Nonhazardous solid waste generated by all of the past, present, and reasonably foreseeable projects presented in **Tables 5-1** and **5-2** would also be disposed of within these counties. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Most of the reasonably foreseeable projects identified in **Table 5-2** are of similar or smaller scale than the ISEGS and would therefore be expected to generate a similar or smaller volume of nonhazardous waste as the ISEGS. Reconstruction of the Eldorado – Ivanpah Transmission Line would create minimal quantities of waste materials that would be used to package and transport insulators and other hardware. Approximately 7.2 existing steel H-frame structures per mile (assuming a current nominal spacing of 736 feet) would be disassembled and removed as scrap and existing conductor and static wire would be removed. It is assumed that the structures, conductor, and static wires would be recycled.

The total amount of available solid waste landfill capacity in San Bernardino County as of June 2008 is 222 million cubic yards according to the San Bernardino County Solid Waste Management Division (Rozzi 2008). The Nevada Division of Environmental Protection Solid Waste Management Plan reports that Clark County, where the cities of Las Vegas and Sloan are located, has landfill capacity of 935 million cubic yards (Campbell 2008). Therefore, even if all of these reasonably foreseeable projects were constructed, the waste generated by the ISEGS would not result in adverse cumulative waste management impacts.

As discussed in Section 4.14, the four tons of hazardous waste from the ISEGS requiring off-site disposal would be far less than the capacity remaining at the probable Class I waste facilities. The hazardous waste, in addition to hazardous wastes that would potentially be generated by the reasonably foreseeable projects would not result in adverse cumulative waste management impacts.

The amount of non-hazardous and hazardous wastes generated during construction and operation of the ISEGS, would add to the total quantity of hazardous and non-hazardous waste generated in the states of California and Nevada. However, ISEGS project wastes, in addition to waste that would potentially be generated by the reasonably foreseeable projects, would not result in adverse cumulative waste management impacts either locally or regionally.

Alternatives

Because no direct or indirect impacts associated with waste management would result from either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts resulting from waste management. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.15 Worker Safety and Fire Protection

BLM reviewed the impacts on the fire and emergency service capabilities of the SBCFD attributable to the construction and operation of ISEGS in conjunction with other existing and foreseeable projects as listed in **Tables 5-1** and **5-2**. For the ISEGS project alone, the limited fire risks and potential for hazardous materials incidents at the proposed facility do not pose substantial added demands on local fire protection services. However, as discussed in Section 4.15, information regarding impacts to County fire and emergency response services is contradictory. Information obtained by BLM from the SBCFD during the DEIS process indicated that the proposed project would not cause an adverse impact to County fire, hazardous materials, and emergency response services. In public comments on the DEIS, the SBCFD disagreed with the DEIS statement that the project would have no adverse impact on these services, and stated that the County would provide their own evaluation of the financial implications of this impact. In an attempt to rectify the contradictory information provided by the SBCFD, BLM submitted a letter to the County requesting additional information on the specific impacts, and the County's financial estimate. However, as of the time of publication of this FEIS, the requested information has not been received. Without additional information, it is assumed that the ISEGS would not contribute to an adverse cumulative impact on existing local fire protection services.

Alternatives

Because no direct or indirect impacts to worker safety and fire protection would result from either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts to these resources. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.16 Geology, Paleontology, and Minerals

Most cumulative impacts related to geology and paleontology only have the potential to occur within boundaries of the project site itself because geologic materials occur at specific locales and are unaffected by activities not acting on them directly. Most geologic impacts of the ISEGS project would be site-specific and would therefore not have the potential to combine with impacts from other projects.

Geologic Hazards

Local subsidence in the form of sinkholes has been observed at the site and along the northern edge of Ivanpah Dry Lake. While its cause can sometimes be attributed to groundwater withdrawal as well as other causes, in this case, the cause is believed to be from dehydration of clays between the soil surface and the water table that can result in a major loss of volume, and thus the collapse of overlying soils (Broadbent 2009). In Section 4.10, the analysis demonstrated that groundwater withdrawal is not causing a local lowering of the water table, and thus would not contribute to subsidence. The project's groundwater use would contribute only 1.8 percent to the existing and only 1.7 percent of the reasonable foreseeable cumulative pumping volume in the Ivanpah Valley Groundwater Basin. The project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. The Ivanpah Valley Groundwater Basin would still have a surplus outflow to the Las Vegas Valley of approximately 1,351 to 2,666 acre-feet per year (AFY). Therefore, the groundwater pumping associated with ISEGS would not contribute to subsidence in the Ivanpah Valley. When combined with impacts of past, present, and reasonably foreseeable projects, ISEGS would not contribute to adverse cumulative impacts.

Mineral Resources

The proposed project site is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals. Sand and gravel resources are present at the site; however, such materials are present throughout the region and the ISEGS should not have an adverse impact on the availability of such resources. In addition, the potential resource would become available again following decommissioning of the project. Construction of ISEGS or other reasonably foreseeable projects (except the Eldorado – Ivanpah Transmission Line) would eliminate the opportunity for mineral extraction from 25,632 to 26,141 acres of land. Although mining could be carried out in an additional 17,000-acre Southern Nevada Supplemental Airport NCA, it is unlikely that Clark County would permit such operations. Cumulative effects on mining from ISEGS and other foreseeable future projects would total approximately 43,000 acres. Actual impacts to the mining industry likely would be minimal due to the scope and extent of mining opportunities in the southern Nevada region. As a result, the ISEGS project would not impact any current or reasonably foreseeable development of geologic or mineral resources.

Paleontological Resources

As discussed in Section 4.16, no paleontological resources have been documented on the ISEGS project site or at the proposed lay down area. However, based on the geology of the site and because paleontological resources have been discovered on sites within two miles of the ISEGS project, the probability of encountering paleontological resources is considered to be generally high on portions of the ISEGS site. For the same reasons, it is likely that paleontological resources have been uncovered during construction of past projects in the Ivanpah Valley and will likely be uncovered during construction of at least some of the reasonably foreseeable projects presented in **Table 5-2**. However, Mitigation Measures would require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists, which would require that earthwork be halted any time potential fossils are recognized by either the paleontologist or the worker. When properly implemented, the mitigation measures yield a net gain to the science of paleontology, since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. It is reasonable to assume that the reasonably foreseeable projects presented in **Table 5-2** would include similar measures to identify, study, and curate any paleontological resources discovered during construction. Therefore, implementation of past, present, and reasonably foreseeable projects would likely result in a net gain to the science of paleontology, and would not combine to result in adverse cumulative impacts to paleontological resources.

Impacts of the ISEGS project would not have the potential to combine with impacts of past, present, and reasonably foreseeable projects to result in a contribution to adverse cumulative impacts to mineralogical and/or paleontological resources.

Alternatives

Because no direct or indirect impacts to geology, paleontology, and mineral resources would result from either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts to these resources. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.17 Livestock Grazing

In addition to the proposed Ivanpah SEGS facility, there are other reasonably foreseeable future actions that could contribute to impacts to the Clark Mountain Allotment. Regionally, impacts to livestock grazing in the planning area have been occurring for 100 years or more. Authorized and unauthorized vehicle use and maintenance and construction of utility rights of way can have an impact to livestock grazing by removal of vegetation utilized for forage, and there is always a danger of vehicle collisions with cattle. The impact of the proposed and probable development projects (mineral production, solar projects, rail lines, and airports) may be more substantial if they require substantial reductions in the acreage of existing allotments.

Examples of recent and future development and land use changes in the Ivanpah area that may impact the allotment include:

- Other solar projects, including the proposed FirstSolar facility that would also be located within the Clark Mountain Allotment;
- The proposed Port-of-Entry to be constructed by the California Department of Transportation (CalTrans) near the Yates Well exit on Interstate 15; and
- Various proposed high-speed rail lines connecting Las Vegas to the Los Angeles area, including the Desert Xpress rail line, and proposed Maglev projects.

The proposed ISEGS project, by itself, would reduce the area of the Clark Mountain Allotment by approximately 4% and would reduce the AUMs permitted on the allotment by 4.7%. This impact would occur on the lower elevations of the allotment, an area which provides lower quality forage than the higher elevation areas. Although the exact size and footprint of the proposed FirstSolar facility has not been finalized, it is likely to be of the same or smaller size than ISEGS, and is also located on the lower slopes of the alluvial fan. The Port-of-Entry would comprise an area of less than 150 acres, and also would occur on the lower elevations. Therefore, the combination of these three items would constitute a reduction of approximately 8% of the lower quality portion of the allotment.

The future route of the proposed high-speed rail lines, especially the proposed Desert Xpress, is not known to the extent necessary to evaluate its contribution to the cumulative impact on the Clark Mountain Allotment. One proposed alignment of the Desert Xpress would be located to the north and west of ISEGS and the proposed FirstSolar project. Because the route would need to be fenced to keep cattle away from the rail system, the proposed rail line would remove a much greater percentage of the land area available within the Clark Mountain Allotment. In addition, this proposed alignment would be located at a higher elevation on the alluvial fan, so the eliminated acreage would be of higher quality than that affected by ISEGS.

With respect to NEPA, the overall impact of the proposed projects in the area may be adverse if the proposed Desert Xpress line is constructed. However, the contribution of the proposed ISEGS project to that cumulative impact is relatively small.

Alternatives

Because they would each reduce the project footprint by 433 acres, both the Mitigated Ivanpah 3 and Modified I-15 Alternatives would have a reduced contribution to cumulative impacts to the Clark Mountain Grazing Lease, as compared to the proposed project. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.18 Wild Horses and Burros

The cumulative impact analysis area for burros is their range within the Clark Mountain HMA boundary. In addition to the proposed ISEGS facility, there are many other past, present, or reasonably foreseeable future actions that contribute to impacts to burros on the Clark Mountain HMA, or on other HMAs within the Mojave Desert as listed in **Tables 5-1** and **5-2**. Examples of recent and future development and land use changes in the Ivanpah area that may impact burros include:

- Authorized and unauthorized vehicle use.
- Maintenance and construction of utility rights of way.
- Mineral exploration and production.
- Other solar projects, including the proposed FirstSolar facility that would also be located within the Clark Mountain Allotment.
- The proposed Desert Xpress rail line.
- The proposed Southern Nevada Supplemental Airport facility at Jean, Nevada.

Regionally, impacts to burros in the CDCA planning area have been occurring for 100 years or more. Authorized and unauthorized vehicle use and maintenance and construction of utility rights-of-way can have a slight impact to burros by removal of vegetation utilized for forage, and there is always a danger of vehicles colliding with burros. The impact of the proposed and probable development projects (mineral production, solar projects, rail lines, and airports) would cumulatively remove and isolate potential grazing sites for burros.

Alternatives

Because no direct or indirect impacts to wild horses and burros would result from either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative, these alternatives would not contribute to any cumulative impacts to these resources. The No Action Alternative also would not contribute to any potential cumulative impacts.

5.2.19 Recreation

The cumulative impact analysis area for recreation includes the Ivanpah Valley region including the surrounding mountain ranges. The period for the analysis is long term. In addition to the proposed ISEGS facility, there are many other past, present, or reasonably foreseeable future actions that contribute to both positive and negative impacts to recreational use of the Ivanpah Valley area as listed in **Tables 5-1** and **5-2**.

Examples of recent and future development and land use changes in the Ivanpah area that may impact recreational use of the area include:

- Authorized and unauthorized vehicle use.
- Maintenance and construction of utility rights of way.
- Mineral exploration and production.
- Other solar projects, including the proposed FirstSolar and NextLight facilities that would also be located within Ivanpah Valley.
- Various proposed high-speed rail lines connecting Las Vegas to the Los Angeles area, including the Desert XPress rail line, and proposed Maglev projects.
- The proposed Southern Nevada Supplemental Airport facility at Jean, Nevada.

Regionally, there have been both positive and negative impacts to recreational resources as a result of development projects within Ivanpah Valley. Improvement of highway access to the Valley, through the construction of I-15, provided direct vehicular access to open desert scenery for residents throughout southern California and Las Vegas. This increased access certainly improved the recreational experience for some users by making the area more accessible, and detracted from the recreational experience for other users who preferred remote camping, hiking, and hunting away from populated areas. Some industrial and commercial development projects, including the proposed project, would remove some lands from potential recreational use, and would provide an impact on the viewscape that would diminish the recreational experience to some degree. Other development projects, including the Primm casinos and Primm Valley Golf Course, have been successful in drawing people to the area for different recreational activities.

Overall, the impact to recreationists from these projects is subjective, because some may be drawn to the development, while others would seek to avoid it. Recreational use of the Primm Casinos and Primm Valley Golf Course is likely to be unaffected, or possibly increase, due to increased ease of access and development of other similar attractions. Conversely, visitors looking to enjoy quality hiking, camping, and other outdoor activities in the surrounding area will be impacted by the diminished natural setting during their drive to those locations, but will be able to continue to enjoy those opportunities recognizing a degraded visual background in some settings.

Recreational use of Ivanpah Dry Lake for land sailing and related events may be impacted if the unique character of the Dry Lake surface is modified through these developments, although this is not likely to occur, based on information currently available. Mitigation Measures for Hazardous Materials Management **HAZ-1 through HAZ-6**, Waste Management **WASTE-1 through WASTE-7**, and **Soil&Water-5** would address the potential for stormwater modification of the Dry Lake surface, as well as transport of hazardous materials, waste or debris to the Dry Lake surface as attributable to the ISEGS project. Therefore, the proposed project would not contribute to adverse cumulative impacts to the Ivanpah Dry Lake.

The combined projects would eliminate recreation within 25,632 to 26,141 acres. If Clark County were to restrict access to the 17,000-acre NCA, cumulative recreation lands affected would total approximately 43,000 acres. The cumulative loss of recreation opportunities likely would place pressure on other Mojave Desert lands that are not subject to development. Displaced recreational users likely would turn to lands that currently are not used for recreation purposes. As currently unused lands become used more, they would degrade accordingly. Under such circumstances, direct and indirect adverse cumulative impacts to recreation would occur.

Alternatives

Although the project acreage and overall visual impact would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives, as compared to the proposed project, the impact on the quality of the recreational experience would be expected to be about the same. This is because the contribution of the alternatives to the change of the area to a more industrial character would about the same as that for the proposed project. The No Action Alternative would not contribute to any potential cumulative impacts to recreation.

Summary

The existing condition of recreation resources that exists today is that there have been both positive and negative impacts to recreational resources as a result of development projects within Ivanpah Valley. Improvement of highway access to the Valley, through the construction of I-15, provided direct vehicular access to open desert scenery for residents throughout southern California and Las Vegas. This increased access improved the recreational experience for some users by making the area more accessible, but likely detracted from the recreational experience for other users who preferred remote camping, hiking, and hunting away from populated areas. Some existing projects have removed land from potential recreational use and impacted the viewscape in a manner that diminishes the recreational experience to some degree. However, other development projects, including the Primm casinos and Primm Valley Golf Course, have been successful in drawing people to the area for different recreational activities.

The impact to this baseline from the reasonably foreseeable future projects is that these projects are not likely to add recreational opportunities, but would increase the industrialization of the valley, likely reducing the quality of recreational experiences in the area. The impact of the proposed project, in addition to the reasonably foreseeable future projects, would be similar. The proposed project may draw persons to the area to view the solar facility, and will likely not detract from the experience of recreationists attracted to the area for the casinos, golfing, and land sailing. However, the contribution of the ISEGS project to the industrial nature of the area, along with the other proposed projects, is likely to contribute to an overall adverse cumulative impact to recreation. Because their size and visual appearance would be similar, the contribution of the Mitigated Ivanpah 3 and Modified I-15 Alternatives to this cumulative impact would be similar to each other, and to those of the proposed project. The No Action Alternative would not contribute to cumulative impacts to recreation.

5.3 Summary of Cumulative Impacts

The proposed ISEGS project and other reasonably foreseeable future projects would potentially contribute to adverse cumulative impacts to air quality, biological resources, land use, traffic, visual resources, and recreation. Those impacts are summarized in the following text and **Table 5.6**.

Construction of ISEGS temporarily would contribute to airborne PM_{10} and equipment exhaust emissions within Ivanpah Valley. Simultaneous construction of ISEGS and the Eldorado – Ivanpah Transmission Line likely would result in cumulative increases in PM_{10} levels and exhaust emissions. It is possible that other reasonably foreseeable future projects, such as NextLight, would be constructed during the same time-frame as ISEGS. If so, the contribution of these additional projects to air quality impacts would likely be mitigated by the same type of measures proposed for ISEGS, and would be of the same magnitude as ISEGS. Operation of ISEGS would contribute fossil fuel combustion products emissions. Cumulative impacts from fossil fuel combustion would result from operations at the Southern Nevada Supplemental Airport and the Southern Nevada Heliport.

Development within Primm, Jean, Sloan, and other areas has eliminated habitat within approximately 3,500 acres within Ivanpah Valley. Installation of ISEGS and other reasonably foreseeable future projects would result in cumulative impacts to biological resources within Ivanpah Valley. Habitat losses from ISEGS would total 3,196 to 4,073 acres (depending on alternative); total cumulative losses from all reasonably foreseeable projects would total 22,000 to 23,000 acres. Cumulative impacts would affect the desert tortoise, other terrestrial species, nesting avian species, and would contribute to increased presence of noxious and invasive weeds.

Previous construction within Ivanpah Valley has changed approximately 3,500 acres of native desert to industrial and commercial use. Construction of ISEGS would change 3,564 to 4,073 acres of relatively undisturbed native desert to an industrial use. Construction of ISEGS and other reasonably foreseeable projects would cumulatively change 25,632 to 26,141 acres. Development of the Southern Nevada Supplemental Airport could affect an additional 17,000 acres of native desert, if Clark County were to develop the NCA for industrial use.

Development within southern Nevada has contributed to traffic congestion along I-15 and traffic levels on local roads. Development of ISEGS and several other reasonably foreseeable future projects within Ivanpah Valley would contribute cumulative impacts to traffic congestion along I-15 and local roads. Cumulative impacts could be reduced to some extent by operation of DesertXpress. Reconstruction of the Eldorado – Ivanpah Transmission Line could result in temporary impacts to local transportation.

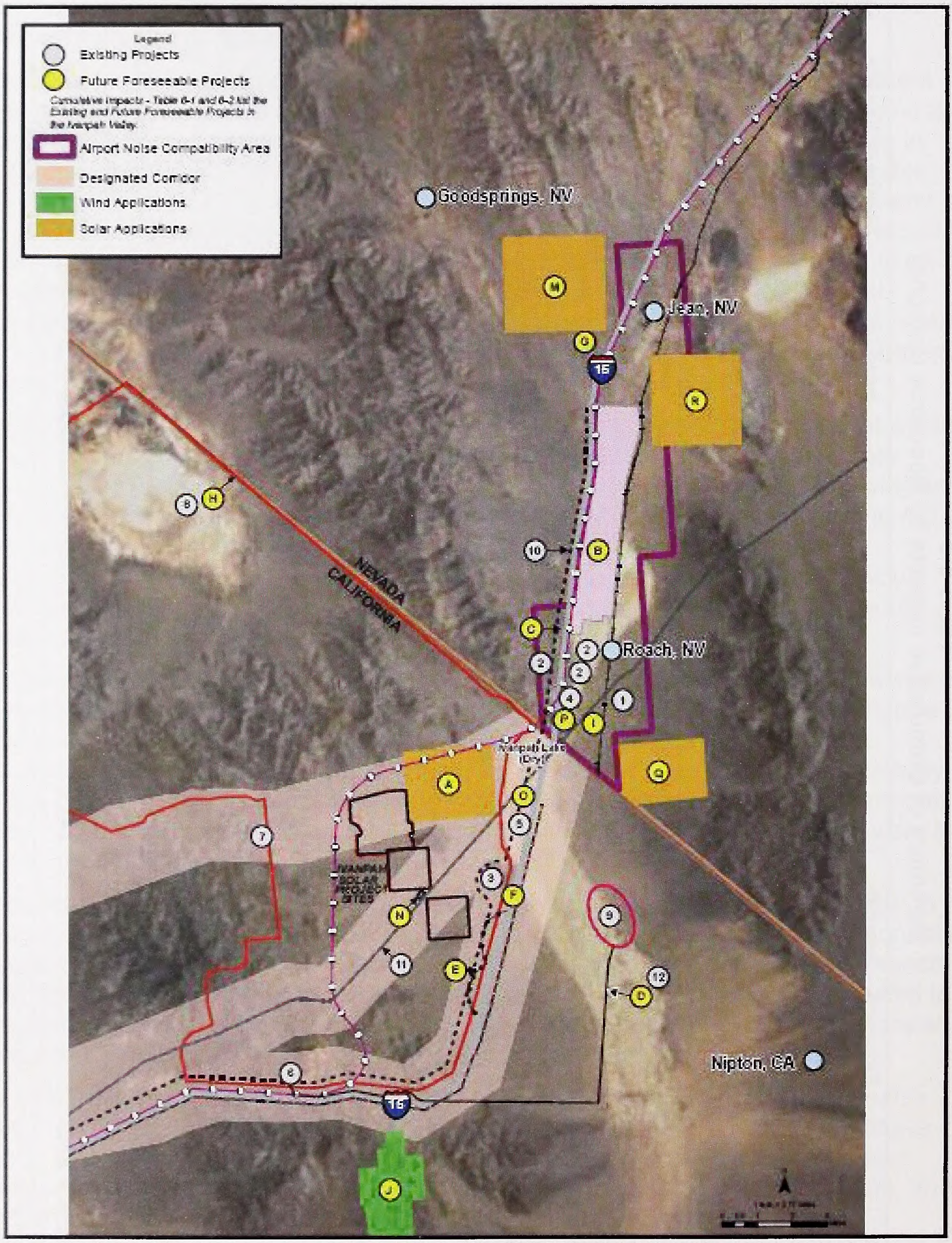
The anticipated visual impacts of the ISEGS project in combination with foreseeable future local projects in the Ivanpah Valley would contribute to an adverse cumulative impact, due to the increasingly industrial character of the area. This impact is also expected to impact some recreational uses of the area, including camping, hiking, and hunting in the Mojave National Preserve.

Table 5-6
Summary of Cumulative Impacts by Resource Category

Resource	Eldorado – Ivanpah Transmission Line	State Line Solar	DesertXpress	NextLight Solar	Southern Nevada Supplemental Airport	Southern Nevada Regional Heliport
Air Quality	Temporary increase in particulate matter during construction. If projects are constructed concurrently, impacts would be cumulative. Each project would be subject to mitigation measures and permit conditions to reduce emissions.					
	No long-term impacts to air quality.	Long-term increase in particulate matter during operations due to absence of vegetative cover and ongoing land-disturbing activities. Cumulative air quality emissions impacts from ISEGS, Southern Nevada Supplemental Airport, and the Southern Nevada Regional Heliport would be partially offset by DesertXpress operations and reduced I-15 traffic.				
Greenhouse Gases	No impacts to greenhouse gas and climate change	Some projects (Stateline Solar, NextLight Solar, and DesertXpress), in combination with ISEGS, cumulatively benefit greenhouse gas emissions.				
Biological	Temporary displacement of wildlife and habitat fragmentation during construction	Cumulative loss of desert tortoise habitat totaling approximately 22,000 to 23,000 acres, increased cumulative potential for invasive and noxious weeds, cumulative impacts to wildlife due to habitat loss and fragmentation				
Cultural	Limited effect would be mitigated by measures required for each project.					
Land Use	No cumulative ISEGS effect	Loss of 4,168 acres of public-use lands	Loss of 2,424 acres of public use lands	Loss of 7,840 acres of public use lands	Loss of 7,400 to 30,800 acres of public use lands[1]	Loss of 236 acres of public use lands
Noise and Vibration	No direct and quantifiable cumulative ISEGS effect					
Public Health and Safety	No direct and quantifiable cumulative ISEGS effect					
Socioeconomics and Environmental Justice	No cumulative ISEGS effect	Slight beneficial impact to local economy from project operations and maintenance			Major beneficial economic impact to southern Nevada	Beneficial economic impact to southern Nevada
Soil and Water Resources	No long-term cumulative ISEGS effect	Increased soil erosion and increased surface water flows to area playas from Stateline Solar, DesertXpress, NextLight Solar and Southern Nevada Supplemental Airport projects is expected to be mitigated through Best Management Practices, permit conditions, and mitigation measures.				No cumulative ISEGS effect
Traffic and Transportation	No cumulative ISEGS effect	Limited cumulative ISEGS effect	Beneficial cumulative effect due to reduced highway vehicle numbers	Limited cumulative ISEGS effect	Probable adverse impacts to surface transportation	Limited cumulative ISEGS effect
Transmission Line Safety	No cumulative ISEGS effect	No cumulative ISEGS effect			No cumulative ISEGS effect.	No cumulative ISEGS effect
Visual Resources	Moderate contribution to cumulative effect	Adverse cumulative visual impacts to approximately 26,000 acres that would become industrialized due to the Stateline Solar, DesertXpress, NextLight Solar, Southern Nevada Supplemental Airport, and the Southern Nevada Regional Heliport projects				
Waste Management	No cumulative ISEGS effect	Short-term temporary impacts to landfills during construction. Minor impacts to landfills during operations				
Worker Safety and Fire Protection	No cumulative ISEGS effect					
Geology, Paleontology, and Minerals	No cumulative ISEGS effect	Long-term loss of mining opportunities within approximately 50,000 acres				
Livestock Grazing	No cumulative ISEGS effect					
Wild Horses and Burros	No cumulative ISEGS effect					
Recreation	No cumulative ISEGS effect	Loss of recreation opportunities on 26,000 to 50,000 acres of public land. Displacement of the public to other recreational areas.				

[1] Airport footprint 7,400 acres, Noise Compatibility Area 17,000 acres, Transportation and Utility Corridor 6,400 acres

Figure 5-1
Ivanpah Solar Electric Generating System - Ivanpah Valley Existing and Future/Foreseeable Projects


Legend
Existing Projects
Future Foreseeable Projects
Cumulative Impacts - Table 6-1 and 6-2 list the Existing and Future Foreseeable Projects in the Ivanpah Valley.
Airport Noise Compatibility Area
Designated Corridor
Wind Applications
Solar Applications
Goodsprings, NV
M
G
Jean, NV
15
K
8
H
NEVADA
CALIFORNIA
10
B
C
2
2
2
Roach, NV
4
1
P
I
Ivanpah Lake (Dry)
A
Q
O
5
7
IVANPAH SOLAR PROJECT SITES
3
F
N
9
11
E
12
D
6
Nipton, CA
15
J

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Data Response - Cumulative Impacts - Figure 3

6.0 Other NEPA Considerations

This section includes discussions of other topics as required by NEPA, including identification of unavoidable adverse impacts, a discussion of irreversible and irretrievable commitment of resources, growth-inducing effects, and the relationship between short-term use and long-term productivity.

6.1 Unavoidable Adverse Impacts

The environmental consequences of the proposed project are described in Section 4. The environmental consequences section analyzes impacts that are significant, whereas this section identified those adverse impacts that cannot be avoided should the proposal be implemented. The adverse environmental effects that cannot be avoided should the project be implemented are associated with biological resources, land use, and visual resources.

6.1.1 Biological Resources

The ISEGS project would have adverse environmental impacts to the biological resources of the Ivanpah Valley, affecting many sensitive plant and wildlife species and eliminating a broad expanse of relatively undisturbed Mojave Desert habitat. Approximately 4,073 acres of occupied desert tortoise habitat would be permanently lost and a minimum of 25 desert tortoises would need to be translocated to a location approved by BLM, USFWS, and CDFG. Impact avoidance and minimization measures described in BLM's analysis and included in the mitigation measures would help reduce impacts to sensitive biological resources.

The No Action Alternative would avoid these impacts. These impacts would be reduced through either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative due to their reduced acreage, and to the avoidance of higher quality habitat associated with Ivanpah Unit 3. However, both alternatives would still impact approximately 3,564 acres of habitat for wildlife and vegetation.

6.1.2 Land Use

Impacts of the ISEGS project would combine with impacts of present and reasonably foreseeable projects to result in a contribution to cumulative impacts in the Ivanpah Valley area related to land use. The existing condition of land use that exists in the Ivanpah Valley area today is that a very small portion of the area (approximately 3,500 acres) has been developed, leaving the vast majority of the area available as wildlife and vegetation habitat, for recreational uses, or for other future development.

The impact to this baseline from the reasonably foreseeable future projects is that approximately 22,000 acres of currently undeveloped land would be developed, substantially increasing the amount of land that has been removed from other land uses in the area. The ISEGS project would add an additional 4,073 acres to this cumulative land use impact. This impact cannot be avoided or reduced through mitigation.

The No Action Alternative would avoid these impacts. These impacts would be reduced through either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative due to their reduced acreage. However, both alternatives would still remove approximately 3,564 acres of land from other multiple uses.

6.1.3 Visual Resources

The proposed project would result in a substantial adverse impact to existing scenic resource values as seen from several Key Observation Points in the Ivanpah Valley and Clark Mountains, including:

- The Primm Valley Golf Course
- Middle-ground-distance viewpoints on Highway I-15
- Viewpoints in the Mojave National Preserve on the east face of Clark Mountain
- Viewpoints in the Stateline Wilderness Area, including the Umberci Mine and vicinity

The potential adverse visual impacts at the Primm Valley Golf Course (KOPs 1 and 2) could be avoided or minimized through mitigation over the long term. However, adverse impacts at the other locations cited above could not be avoided or reduced through mitigation, and would thus result in unavoidable adverse impacts if the proposed project is implemented.

The No Action Alternative would avoid these impacts. These impacts would be reduced through either the Mitigated Ivanpah 3 Alternative or the Modified I-15 Alternative due to their reduced acreage, number of power towers, number of heliostats, and location of the facility with respect to sensitive viewers. However, both alternatives would still contribute to an overall increase in the industrial character of the Ivanpah Valley area.

6.2 Irreversible and Irretrievable Commitment of Resources

Section 40 CFR 1502.16 of the NEPA regulations requires a discussion of any irreversible or irretrievable commitments of resources which would be involved in the proposed project.

Implementation of the proposed project would result in the consumption of energy as it relates to the fuel needed for construction-related activities. Large amounts of gasoline, diesel, and jet fuel would be required for project construction. Additionally, construction would require the manufacture of new materials, some of which would not be recyclable at the end of the lifetime of the proposed project. The raw materials and energy required for the production of these materials would also result in an irretrievable commitment of natural resources. Operation of the proposed project would not cause a substantial increase in the consumption or use of non-renewable resources. The No Action Alternative would not require any non-renewable resources to implement. The Mitigated Ivanpah 3 and Modified I-15 Alternatives would both use non-renewable resources on approximately the same scale as the proposed project.

Implementation of the proposed project would require the loss of approximately 4,073 acres of vegetation and habitat. The loss of this habitat would be long-term, enduring throughout the proposed 50-year lifespan of the facility. Following decommissioning, restoration would be conducted which would involve removal of structures, restoration of topography, and revegetation, all of which would work towards restoration of the original habitat. However, it is likely that restoration of native vegetation would be slow, and the success uncertain. Therefore, the loss of desert tortoise habitat is assumed to be permanent since restoration of vegetation for which they depend for foraging and other factors affecting the quality of the restored habitat are uncertain. There would be no habitat degradation associated with the No Action Alternative. Although both the Mitigated Ivanpah 3 Alternative and the Modified I-15 Alternative would impact a reduced area of habitat (3,564 acres), both would still create large-scale impacts to tortoise habitat that would be assumed to be permanent. By reconfiguring the location of Ivanpah Unit 3 away from high quality habitat, and towards lesser quality habitat along I-15, the Modified I-15 Alternative would likely have the least effect on habitat of any of the three project-building alternatives.

The majority of access required for construction and operation of the proposed project would utilize existing public ROWs and access roads. The proposed project would require re-routing the existing Colosseum Road through the construction logistics area, but the re-routed road would re-connect with the existing road to the west of the facility. Therefore, the project would not affect opportunities for public access. The routes would not be affected under the No Action Alternative. Both the Mitigated Ivanpah 3 and Modified I-15 Alternatives would require closure and re-routing or currently existing roads, but the scale of this re-routing would be approximately the same as that for the proposed project.

Construction and operation of the proposed project would require the use of a limited amount of hazardous materials such as fuel, lubricants, and cleaning solvents. All hazardous materials would be stored, handled, and used in accordance with Best Management Practices proposed by the applicant, and by compliance with applicable, federal, state, and local regulations, including a construction-phase SWPPP and an operational-phase SWPPP. Assuming appropriate implementation of these plans and practices as are recommended in the mitigation measures, potential degradation of the environment due to accidental spills associated with the proposed project's use of hazardous materials would be minimized to the extent practicable. The No Action Alternative would involve no risks associated with hazardous materials use. The risks associated with the use of hazardous materials for the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be approximately the same as those for the proposed project.

The loss of visual quality associated with the project site would be adverse and long-term, enduring throughout the proposed 50-year lifespan of the facility. After the end of the project's useful life, it would be decommissioned as described in the applicant's Draft Closure, Revegetation, and Rehabilitation Plan. The facility would be removed, original contours restored, and the site revegetated. However, the removal of the existing facility would leave a very prominent visual impact over the entire site due to the strong color contrast created between graded, disturbed soil areas and undisturbed soil areas in the vicinity of the project site. In addition, revegetation of areas in this desert region are difficult and generally of limited success. Thus, visual recovery from land disturbance of closure and decommissioning would likely occur only over a very long period of time. The No Action Alternative would have no long-term visual impacts. The visual impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would, like the proposed project, continue long after the projects are decommissioned. In both cases, the size of the disturbed area would be smaller than that for the proposed project, due to the reduction of 433 acres in the size of the projects. However, in the case of the Modified I-15 Alternative, the long-term impact could be more visible to viewers on I-15 because the disturbed area would be located directly adjacent to the highway.

6.3 Growth-Inducing Effects

Section 1508.8(b) of NEPA requires that an EIS discuss growth-inducing impacts of a project. The discussion must address how a proposed project may remove obstacles to growth, or encourage or facilitate other activities that could adversely impact the environment, either individually or cumulatively. Typically, the growth-inducing potential of a proposed project would be considered adverse if it fosters growth or a concentration of population above what is assumed in local and regional land use plans, or in projections made by regional planning authorities. Adverse growth-inducing impacts could also occur if a project adds infrastructure or service capacity which could accommodate growth levels which exceed those permitted by local or regional plans and policies.

The proposed project would employ up to 959 construction personnel and 90 operations personnel. Research shows that construction workers would commute as much as two hours each direction from their communities rather than relocate, and operations workers would commute as much as one hour (EPRI 1982). BLM reviewed the socioeconomics data for counties within the one-hour and two-hour commute ranges, which is within the study area and includes San Bernardino County and Clark County. **Table 4.9-3** indicates that a total of 231,000 construction workers are available within the study area. In addition, a total of 90 workers would account for a negligible amount of the total San Bernardino County and Clark County total labor force. As all workers would reside within the study area, no impacts to existing population levels would occur. Because the number of operational workers required represents such a small portion of the local available labor force, no adverse impacts to the study area population or employment base would result from proposed project operation. Because employment levels associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be approximately the same as those for the proposed project, the potential impacts would also be the same.

As discussed in Section 2, the primary need for the proposed project is driven by Federal and state requirements regarding the generation of renewable energy. According to the Energy Commission, peak electricity demand within California is projected to increase at a rate of 1.35% per year from 2008 through 2018 (CEC 2007c), and therefore, additional generating capacity from new sources will be required. The proposed project is not intended to supply power related to growth for any particular development, either directly or indirectly, and would not result in direct growth-inducing impacts. However, the proposed project could facilitate growth indirectly through the additional increased capacity of electric power that it would make available. Because the Mitigated Ivanpah 3 and Modified I-15 Alternatives would generate a reduced amount of power (370 MW) as compared to the proposed project (400 MW), the potential for these alternatives to facilitate growth would also be slightly lower.

6.4 The Relationship Between Short-Term Use and Long-Term Productivity

The proposed project would result in adverse, short-term impacts due to construction-related activities. Short-term impacts are those that would occur only during the period of construction, and would then cease at the end, or shortly after the end, of construction. Many adverse impacts, as discussed below, would occur throughout the 50-year operational life of the proposed project. Some adverse impacts, especially those associated with the removal of vegetation (such as biological and visual impacts), would continue for many years following site decommissioning.

Adverse short-term impacts to air quality would occur as a result of emissions from construction vehicles, commuting for construction workers, and fugitive dust emissions from active grading and wind erosion of exposed soils. Most of these impacts would cease at the end of construction. Fugitive dust emissions from erosion of exposed soils would continue for a short period after construction ceases, but decrease as revegetation of temporarily disturbed areas takes place. Following construction, adverse air quality impacts associated with operations would continue, but at a level reduced from that associated with construction. Both construction and operation-related emissions would be reduced through a combination of applicant-proposed mitigation measures, Energy Commission conditions, and compliance with federal, state, and local regulations. Following decommissioning, air quality impacts associated with emissions would cease. None of these impacts would occur as a result of the No Action Alternative. The level and duration of impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be the same as those for the proposed project.

The biological resources impacts associated with the proposed project would result primarily from the removal of wildlife and vegetation from the project area, fencing of the project area to keep wildlife out of the area, and operations of the facility. As such, all biological resource impacts discussed in Section 4.3 would be expected to endure throughout the 50-year operational life of the facility. Following decommissioning of the facility, some potential impacts associated with operations, such as impacts to bird collisions with power towers and heliostats, would cease immediately. However, adverse impacts to vegetation and wildlife associated with site disturbance would continue for many years following decommissioning, and the duration of the impacts would depend on the rate of success of site revegetation efforts. None of these biological resources impacts would occur with the No Action Alternative. The duration of impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be the same as those for the proposed project.

The adverse land use impacts associated with the proposed project are also related to the fencing of the project area, and its removal from other uses during its operational life. As such, these impacts would endure throughout the 50-year operational period. Following site decommissioning, the project fence would be removed, and the site would immediately be made available for other multiple land uses. However, return of the site to its current use as undisturbed habitat would take much longer, due to the length of time required for site revegetation efforts. No adverse land use impacts would occur as a result of the No Action Alternative. The duration of adverse land use impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be the same as those for the proposed project.

Socioeconomic impacts associated with the proposed project are expected to be beneficial, due to the payment of taxes and increased employment. These beneficial impacts would be greatest during project construction, when employment levels are highest, and would then continue at a reduced level during project operations. These beneficial impacts would cease when the project is decommissioned. There would be no beneficial socioeconomic impacts associated with the No Action Alternative. The duration of beneficial socioeconomic impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be the same as that for the proposed project.

Adverse impacts to visual resources would begin immediately when project construction begins, and continue for many years following project decommissioning. However, the source and type of visual impacts would change throughout the life cycle of the project. During the construction phase, adverse visual impacts would be associated with the change in color and texture of the project area as vegetation is removed and bare soil is revealed. Once the project becomes operational, the primary visual components would become the industrial appearance of the power towers and heliostat fields, including potential glare from reflective surfaces. Following decommissioning, the visual appearance of the project area is likely to continue to be different from the surrounding areas for many years, due to the length of time required for revegetation efforts. There would be no adverse visual impacts associated with the No Action Alternative. The adverse visual impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would have the same duration, and undergo the same types of changes through time, as those of the proposed project.

The magnitude and type of adverse impacts to traffic from the proposed project would also change through time. The level of these adverse impacts would be at their highest during project construction, due to the highest levels of employment and equipment deliveries during this time. Once the project became operational, adverse traffic impacts associated with worker commuting and deliveries would continue, but at a reduced level. Traffic impacts could temporarily increase during decommissioning, but would then cease immediately following decommissioning. No adverse traffic impacts would occur as a result of the No Action Alternative. The duration of adverse traffic impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives, including the change in impacts in the different phases of the project, would be the same as those for the proposed project.

The adverse impacts to recreation identified in Section 4.19 were primarily a result of the change of the visual character of the Ivanpah Valley area from undeveloped desert to a more industrial character. Therefore, the duration of the recreation impacts would be approximately the same as the duration of the visual impacts.

7.0 Standard BLM Terms and Conditions and Mitigation

7.1 Introduction

As described in Section 4.0 of the FEIS, the ISEGS project contains measures to mitigate or reduce impacts. These measures have been developed through a number of sources. The mitigation measures include a combination of the following:

- Measures that have been proposed by the applicant;
- Conditions of Certification proposed by the California Energy Commission;
- The project's General Conditions for Compliance 1 through 14 found in Appendix C
- Regulatory requirements of federal, state, and local agencies;
- USFWS terms and conditions identified in the Biological Opinion; and
- Additional BLM-proposed mitigation measures and standard ROW grant terms and conditions.

This section addresses the Standard BLM Terms and Conditions that would be contained in any right-of-way grant approved for the project. These terms and conditions are not directly tied to any specific resource impact as a mitigation measure but are nonetheless necessary for administration of any right-of-way authorization that is approved for the facility.

1. The holder shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the Plan of Development which was approved and made part of the grant on ________________. Any relocation, additional construction, or use that is not in accord with the approved plan of development, shall not be initiated without the prior written approval of the authorized officer. A copy of the complete right-of-way grant, including all stipulations and approved plan of development, shall be made available on the right-of-way area during construction, operation, and termination to the authorized officer. Noncompliance with the above will be grounds for immediate temporary suspension of activities if it constitutes a threat to public health and safety or the environment.
2. The holder will not initiate any construction or other surface disturbing activities on the ROW without prior written authorization of the Authorized Officer. Such authorization will be a written Notice to Proceed (NTP) (Form 2800-15) issued by the Authorized Officer or his delegated representative. Each NTP will authorize construction or use only as therein expressly stated and only for the particular location or use therein described, i.e., a construction spread by number or compressor station by name. The Authorized Officer will issue a NTP subject to such terms and conditions as deemed necessary when the design, construction, use, and operation proposals are in conformity with the terms and conditions of these stipulations.

3. The Authorized Officer may suspend or terminate (in writing) in whole or in part any NTP which has been issued, when in his judgment, unforeseen conditions arise which result in the approved terms and conditions being inadequate to protect the public health and safety or to protect the environment.
4. The holder will be in compliance with the Biological Opinion for listed and proposed species associated with this project signed by the US Fish and Wildlife Service on ________________.
5. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.
6. Unless otherwise agreed to by the authorized officer in writing, powerlines shall be constructed in accordance to standards outlined in "Suggested Practices for Raptor Protection on Powerlines," Raptor Research Foundation, Inc., 1996. The holder shall assume the burden and expense of proving that pole designs not shown in the above publication are "eagle safe." Such proof shall be provided by a raptor expert approved by the authorized officer. The BLM reserves the right to require modifications or additions to all powerline structures placed on this right-of-way, should they be necessary to ensure the safety of large perching birds. Such modifications and/or additions shall be made by the holder without liability or expense to the United States.
7. The holder will attend preconstruction conference(s) prior to the holder's commencing construction and/or surface disturbing activities on the ROW. The holder and/or his representatives will attend this conference. The holder's contractor, or agents involved with construction and/or any surface disturbing activities associated with the ROW, will also attend this conference to review the stipulations of the grant including the plan(s) of development, as applicable.
8. The holder shall designate a representative who shall have the authority to act upon and to implement instructions from the authorized officer. The holder's representative shall be available for communication with the authorized officer within a reasonable time when construction or other surface disturbing activities are underway.
9. The holder shall start construction of the initial phase of development within 12 months after issuance of a Notice to Proceed but no later than 2 years after the effective date of the issuance of the right-of-way authorization. The holder shall complete construction within the timeframes approved in the ROW grant and Plan of Development, but no later than 24 months after start of construction.

10. If a ROW grant and approved Plan of Development provides for a phased development, construction of each subsequent phase must begin within 3 years of the start of construction of the previous phase.

11. During operations, the holder shall maintain all onsite electrical generation equipment and facilities in accordance with the design standards in the approved Plan of Development. Any idle, improperly functioning, or abandoned equipment or facilities that have been inoperative for any continuous period of 3 months must be repaired, placed into service, and/or removed from the site within 30 days from receipt of a written Notice of Failure to Ensure Diligent Development, unless the holder is provided an extension of time by the BLM Authorized Officer.

12. Failure of the holder to comply with any diligent development provision of the authorization may cause the BLM authorized officer to suspend or terminate the authorization in accordance with 43 CFR 2807.17 and 18, and use the posted Performance and Reclamation bond to cover the costs for removal of any idle or abandoned equipment and/or facilities.

13. A bond, acceptable to the authorized officer, in the amount of $____________ shall be furnished by the holder prior to receiving a Notice to Proceed or at such earlier date as may be specified by the authorized officer. This bond must be maintained in effect until removal of improvements and restoration of the ROW have been accepted by the authorized officer. The only bond instruments acceptable to BLM are cash, cashier's, or certified check, certificate or book entry deposits, negotiable U.S. Treasury bonds equal in value to the bond amount, or surety bonds from the approved list of sureties (U.S. Treasury Circular 570) payable to the Bureau of Land Management.

    The holder agrees that all monies deposited with the authorized officer as security for holder's performance of the terms and conditions of this grant may, upon failure on the holder's part to fulfill any of the requirements herein set forth or made a part hereof, be retained by the United States to be applied as far as may be needed to the satisfaction of the holder's obligations assumed hereunder, without prejudice whatever to any other rights and remedies of the United States.

    Should the bond delivered under this grant become unsatisfactory to the authorized officer, the holder, shall, within 30 days of demand, furnish a new bond.

    In the event of noncompliance with the terms and conditions of the ROW grant, the BLM will notify the holder that the surety (if one is used) or other bond instrument is subject to forfeiture and will allow the holder 15 days to respond before action is taken to forfeit the bond.

14. The holder shall protect all survey monuments found within the right-of-way. Survey monuments include, but are not limited to, General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U.S. Coastal and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the holder shall immediately report the incident, in writing, to the

authorized officer and the respective installing authority if known. Where General Land Office or Bureau of Land Management right-of-way monuments or references are obliterated during operations, the holder shall secure the services of a registered land surveyor or a Bureau cadastral surveyor to restore the disturbed monuments and references using surveying procedures found in the Manual of Surveying Instructions for the Survey of the Public Lands in the United States, latest edition. The holder shall record such survey in the appropriate county and send a copy to the authorized officer. If the Bureau cadastral surveyors or other Federal surveyors are used to restore the disturbed survey monument, the holder shall be responsible for the survey cost.

15. Use of pesticides shall comply with all applicable Federal and State laws. Pesticides shall be used only in accordance with their registered uses within limitations imposed by the Secretary of the Interior. Prior to the use of the pesticides, the Holder shall obtain from the Authorized Officer, written approval of a Pesticide Use Proposal Plan showing the type and quantity of material to be used, pest(s) to be controlled, method of application, locations of storage and disposal of containers, and any other information deemed necessary by the Authorized Officer.

16. Only those chemicals (pesticides and herbicides) listed on the BLM approved label list are authorized for use on public lands. A Pesticide Use Proposal (PUP) must be submitted for each chemical used, and it cannot be used until approval has been obtained in writing from the BLM authorized officer. The report needs to include any surfactants or dyes used in the spraying operation. Applicator(s) of chemicals used must have completed the pesticide certification training and have a current up to date Certified Pesticide Applicator's License. Pesticide Application Records for the areas and acres treated must be submitted to the BLM ______________Field Office each year. This includes the following:

    - Brand or Product name
    - EPA registration number
    - Total amount applied (use rate #A.I./acre)
    - Date of application
    - Location of application
    - Size of area treated
    - Method of treatment (air/ground)
    - Name of applicator
    - Certification number and dates
    - Costs to treatment
    - Amount of surfactants or dyes used in spraying operation

    The record information must be recorded no later than 14 days following the pesticide application and must be maintained for ten years.

17. Construction sites shall be maintained in a sanitary condition at all times; waste materials at those sites shall be disposed of promptly at an appropriate waste disposal site. 'Waste' means all discarded matter including, but not limited to, human waste, trash, garbage, refuse, oil drums, petroleum products, ashes, and equipment. A litter policing program shall be implemented by the holder which covers all roads and sites associated with the right-of-way.
18. The holder will be liable for all fire suppression costs resulting from fires caused during construction. All guidelines and restrictions imposed by agency fire control officials will be followed.
19. The Holder shall fund and implement a third party Compliance Program with the Authorized Officer in accordance with the Compliance Monitoring Plan. The project's General Compliance Mitigation Measures will be integrated into a BLM Compliance Monitoring Plan (hereafter referred to as the Compliance Plan) to assure compliance with the terms and conditions of any approved ROW grant, including the approved Plan of Development (POD)

    The Compliance Plan is composed of elements that:

    - set forth the duties and responsibilities of BLM's Authorized Officer, the project owner, delegate agencies, and others;
    - set forth the requirements for handling confidential records and maintaining the compliance record;
    - list procedures for settling disputes and making post-authorization changes;
    - list procedures for requesting and approving ROW Grant or POD changes;
    - list the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all BLM approved mitigation measures;
    - establish requirements for modifications or amendments to facility Closure, Revegetation, and Restoration Plans; and
    - specify additional BLM mitigation measures for each technical area containing the measures required to mitigate any and all potential adverse project impacts associated with construction, operation and closure.

Definitions

The following terms and definitions are used to establish when Mitigation Measures are implemented.

BLM Authorized Officer

The BLM Authorized Officer for the Project is the BLM Needles Field Manager or his designated Compliance Inspector that is responsible for oversight and inspection of all construction and operational related activities on public land.

Pre-Construction Site Mobilization

Site mobilization is limited preconstruction activities at the site to allow for the installation of fencing, construction trailers, construction trailer utilities, and construction trailer parking at the site. Limited ground disturbance, grading, and trenching associated with the above mentioned pre-construction activities is considered part of site mobilization. Walking, driving or parking a passenger vehicle, pickup truck and light vehicles is allowable during site mobilization.

Construction

Onsite work to install permanent equipment or structures for any facility.

Ground Disturbance

Construction-related ground disturbance refers to activities that result in the removal of top soil or vegetation at the site beyond site mobilization needs, and for access roads and linear facilities.

Grading, Boring, and Trenching

Construction-related grading, boring, and trenching refers to activities that result in subsurface soil work at the site and for access roads and linear facilities, e.g., alteration of the topographical features such as leveling, removal of hills or high spots, moving of soil from one area to another, and removal of soil.

Notwithstanding the definitions of ground disturbance, grading, boring and trenching above, construction does **not** include the following:

1. the installation of environmental monitoring equipment;
2. a soil or geological investigation;
3. a topographical survey;
4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; and
5. any work to provide access to the site for any of the purposes specified in "Construction" 1, 2, 3, or 4 above.

Start of Commercial Operation

For compliance monitoring purposes, "commercial operation" begins after the completion of start-up and commissioning, when each of the power plants has reached reliable steady-state production of electricity at the rated capacity. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager.

7.2 BLM's Authorized Officer Responsibilities

BLM's Authorized Officer shall oversee the compliance monitoring and is responsible for:

1. Ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of BLM's ROW

2. Resolving complaints
3. Processing post-authorization changes to the mitigation measures
4. Documenting and tracking compliance filings
5. Ensuring that compliance files are maintained and accessible

BLM's Authorized Officer is the contact person for BLM and will consult with appropriate responsible agencies when handling disputes, complaints, and amendments. All project compliance submittals are submitted to BLM's Authorized Officer or his designated representative for processing.

Chief Building Official Responsibilities

The CBO shall serve as BLM's and the Energy Commission's delegate to assure the project is designed and constructed in accordance with BLM's Right-of-Way Grant, BLM mitigation measures, the Energy Commission's Decision including Conditions of Certification, California Building Standards Code, local building codes and applicable laws, ordinances, regulations and standards to ensure health and safety. The CBO is typically made-up of a team of specialists covering environmental, civil, structural, mechanical and electrical disciplines whose duties include the following:

1. Performing design review and plan checks of all drawings, specifications and procedures;
2. Conducting construction inspection;
3. Functioning as BLM's and the Energy Commission's delegate including reporting noncompliance issues or violations to the BLM Authorized Officer for action and taking any action allowed including issuing an Immediate Temporary Suspension of activities, to ensure compliance;
4. Exercising access as needed to all project owner construction records, construction and inspection procedures, test equipment and test results; and
5. Providing weekly reports on the status of construction to BLM's Authorized Officer.

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8.0 Summary

8.1 Comparison of Impacts Between Alternatives

A comparison of the impacts associated with the proposed project, Mitigated Ivanpah 3, Modified I-15, and No Action Alternatives is presented in **Table 8-1** below.

Although the proposed project would achieve all project objectives, and generate the maximum amount of beneficial socioeconomic, greenhouse gas, and air pollutant impacts, it would also result in the greatest number and magnitude of adverse impacts. These would include impacts to Biological Resources, Soil and Water Resources, and Visual Resources that could not be completely mitigated.

Selection of the Mitigated Ivanpah 3 Alternative would accomplish all of the objectives of the purpose and need, including meeting power demand, as well as federal and state objectives for renewable energy development. It would also achieve almost all of the beneficial impacts of the proposed project, including socioeconomic benefits of increases in employment and fiscal resources, and displacement of greenhouse gas and air pollutant emissions associated with fossil-fueled power plants. While meeting these objectives and providing these beneficial impacts, the adverse impacts of the Mitigated Ivanpah 3 Alternative would be much lower than the proposed project, especially in the areas of Biological Resources, Soil and Water Resources, and Visual Resources.

Selection of the Modified I-15 Alternative would also accomplish all of the objectives of the purpose and need, including meeting power demand, as well as federal and state objectives for renewable energy development. It would also achieve almost all of the beneficial impacts of the proposed projects, including socioeconomic benefits of increases in employment and fiscal resources, and displacement of greenhouse gas and air pollutant emissions associated with fossil-fueled power plants. While meeting these objectives and providing these beneficial impacts, the adverse impacts of the Modified I-15 Alternative would be lower than the proposed project in some areas, but would be increased in other areas. With respect to Biological Resources, the Modified I-15 Alternative would have a reduced impact on high quality desert tortoise habitat, as a result of moving Ivanpah Unit 3 to a location which partially overlaps the lower quality habitat adjacent to Interstate 15. However, impacts to Visual Resources and potential glare impacts for viewers on Interstate 15 would increase, due to the placement of heliostat fields within 1,000 feet of the highway for a distance of 1.8 miles. The Modified I-15 Alternative could also result in an increase in impacts to recreational access as compared to the proposed project, due to the greater length of existing OHV trails that would be included within the project footprint.

Most of the impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be very similar to each other, based on the similar size, technology, and configuration of the facility. The only physical difference between the two alternatives would be the location of Ivanpah Unit 3, which would border the northern portion of the facility in the Mitigated Ivanpah 3 Alternative, and the southern portion of the facility in the Modified I-15 Alternative. This difference in location results in potentially different impacts to several resources, as follows:

- Biological Resources

  The difference in location has the potential to impact different habitat, wildlife, and plants in the two different locations. The northern location of Ivanpah Unit 3 in the Mitigated Ivanpah 3 Alternative is likely to have a higher density of tortoises and rare plants, and therefore a higher potential for impacts, than the southern location of Ivanpah Unit 3 in the Modified I-15 Alternative.

- Land Use

  Both the Mitigated Ivanpah 3 and Modified I-15 Alternatives would partially occupy designated utility corridors; however, the corridors involved are different from each other. Under the Mitigated Ivanpah 3 Alternative, Ivanpah Unit 3 would occupy a portion of utility corridor D, while Ivanpah unit 3 in the Modified I-15 Alternative would partially occupy corridor B. In both cases, portions of the corridors would remain available for other uses.

- Soil and Water

  Based on a review of topographic information and stormwater modeling that covers a portion of the Modified I-15 site, it is likely that the position of the Modified I-15 site is similar to, or possibly slightly more favorable than, the Mitigated Ivanpah 3 site with respect to potential stormwater damage.

- Traffic and Transportation

  The potential issue of distraction to drivers on Interstate 15 due to glare from the heliostats and power tower receivers cannot be quantified, and is difficult to predict. If this issue should occur, it would likely be more disruptive at the Modified I-15 location than the Mitigated Ivanpah 3 location, due to the closer proximity of the heliostats and power towers to Interstate 15.

- Visual Resources

  With respect to the position of viewers located on Clark Mountain or the Stateline Wilderness to the north and west of the facility, visual impacts associated with the Modified I-15 Alternative would be lower than those for the Mitigated Ivanpah 3 Alternative. This would be due to the more distal location of Ivanpah Unit 3 in the Modified I-15 Alternative. For the same reason, visual impacts to viewers on Interstate 15 would be higher for the Modified I-15 Alternative, due to the situation of Ivanpah Unit 3 within 1,000 feet of the highway, for a distance of approximately 1.8 miles.

- Recreation

  Both the Mitigated Ivanpah 3 Alternative and the Modified I-15 Alternative would occupy land that currently includes designated OHV trails used for recreation. In both cases, the trails would be re-routed around the outside of the facilities. The length of trails that would be affected would be 8,100 feet (1.5 miles) for the

Mitigated Ivanpah 3 Alternative, and 12,270 feet (2.4 miles) for the Modified I-15 Alternative.

Although it would have no adverse impacts, the No Action Alternative would not accomplish project objectives of meeting the demand for power, or contribute to meeting state and federal objectives for renewable energy development. It also would not provide the beneficial impacts associated with the proposed project and Mitigated Ivanpah 3 Alternative, including the socioeconomic benefits. By not contributing to the development of renewable energy, the No Action Alternative would cause the state to continue to rely on fossil-fueled energy sources, with the associated greenhouse gas and air pollutant emissions.

8.2 Identification of Preferred Alternative

Public comments received on the Supplemental DEIS included additional information and opinions regarding the relative merits of the four alternatives. A detailed discussion of these comments is provided in Appendix A-2. The following summarizes the major points of the comments with respect to the identification of a preferred alternative:

- Many commentors, including the applicant, public officials, labor unions, and individuals favor the proposed project because it would meet the growing electricity needs of the region, would generate that power without releasing greenhouse gases, and would provide jobs. However, numerous other commentors, including environmental organizations and individuals, either oppose the proposed project, or desire that it be modified, due to the adverse impacts that the project would have on biological resources, visual resources, recreation, air quality, and land uses.
- The applicant and individuals provided comments in support of the Mitigated Ivanpah 3 Alternative. These comments supported this alternative for the reasons cited for the proposed project above, as well as the fact that the alternative would result in a reduction of adverse impacts to biological resources. Several of the environmental organizations and individuals who were opposed to the proposed project also opposed the Mitigated Ivanpah 3 Alternative, primarily because they felt that the reduction in adverse impacts associated with this alternative was not as great as could be achieved through the Modified I-15 Alternative.
- The Modified I-15 Alternative was supported by several environmental organizations, including the Sierra Club, primarily because placement of the facility closer to I-15 would minimize adverse impacts to biological resources. The applicant opposed the Modified I-15 Alternative for several technical and impact-related reasons. In their comments on the Supplemental DEIS, the applicant noted that the Modified I-15 Alternative could not be made technically or financially feasible for them to implement to meet ARRA deadlines. This is due primarily to the length of time that would be needed to re-design and re-configure the engineering design for the project. The applicant also cited increased visual impacts in their opposition to the Modified I-15 Alternative.

- Numerous commentors, including environmental organizations and individuals, supported the No Action Alternative. This was primarily due to concerns with placing the facility in a currently undeveloped location, the likelihood that the facility would incrementally add to industrialization of Ivanpah Valley, and the lack of suitable mitigation and compensation for desert tortoises. Some commentors, such as the Center for Biodiversity, stated a preference for the No Action Alternative, but stated that if a facility must be built, then they preferred the Modified I-15 Alternative.

Based on the comparative analysis of the ability of each alternative to meet the purpose and need, and the environmental impacts that would be associated with each alternative as discussed in this FEIS and as summarized above, the Mitigated Ivanpah 3 Alternative is identified as the preferred alternative.

Table 8-1
Comparison of Impacts Between Alternatives

Resource	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Air Quality	• Potential impacts could occur, would be mitigated • Beneficial impact is the avoidance of greenhouse gas and pollutant emissions associated with fossil-fueled power plants	• Potential impacts could occur, would be mitigated • Lower overall air emissions than proposed project, same as Modified I-15 • Higher short-term NOx concentrations than proposed project, same as Modified I-15 • Beneficial avoidance of greenhouse gas and pollutant emissions would be lower than proposed project, same as Modified I-15	• Potential impacts could occur, would be mitigated • Lower overall air emissions than proposed project, same as Mitigated Ivanpah 3 • Higher short-term NOx concentrations than proposed project, same as Mitigated Ivanpah 3 • Beneficial avoidance of greenhouse gas and pollutant emissions would be lower than proposed project, same as Mitigated Ivanpah 3	• No adverse impacts • Would not achieve beneficial impact of avoiding greenhouse gas and pollutant emissions associated with fossil-fueled power plants
Biological Resources	• Direct adverse impacts to desert tortoise • Potential impacts to MBTA and Special Status bat species • Potential impacts to Special Status plant species	• Tortoise impacts reduced from proposed project, but likely still higher than Modified I-15 • Potential impacts to MBTA and Special Status bat species • Special status plant impacts reduced from proposed project. Existing information suggests rare plant impacts would be higher at Mitigated Ivanpah 3 than Modified I-15; however, field surveys required at Modified I-15 to confirm this.	• Tortoise impacts reduced from proposed project, and likely also reduced from Mitigated Ivanpah 3 • Potential impacts to MBTA and Special Status bat species • Special status plant impacts likely reduced from proposed project. Existing information suggests rare plant impacts would be lower at Modified I-15 than at Mitigated Ivanpah 3; however, field surveys required at Modified I-15 to confirm this.	• No adverse impacts

Resource	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Cultural Resources	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project reduced due to reduced acreage of disturbance • Impacts likely to be similar to Modified I-15 • Impacts could be mitigated	• Potential impacts would be lower than proposed project reduced due to reduced acreage of disturbance • Impacts likely to be similar to Mitigated Ivanpah 3 • Impacts could be mitigated	• No adverse impacts
Hazardous Materials Management	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction • Impacts likely to be similar to Modified I-15 • Impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction • Impacts likely to be similar to Mitigated Ivanpah 3 • Impacts could be mitigated	• No adverse impacts
Land Use	• Conforms with land use plans • Partially covers designated utility corridors • Contributes to cumulative removal of land from other land uses	• Conforms with land use plans • Reduced impact on designated utility corridors, as compared to proposed project • Utility corridor impacts in different location than Modified I-15, but of the same magnitude • Reduced contribution to cumulative removal of land from other land uses when compared to proposed project • Contribution to cumulative removal of land similar to Modified I-15	• Conforms with land use plans • Reduced impact on designated utility corridors, as compared to proposed project • Utility corridor impacts in different location than Mitigated Ivanpah 3, but of the same magnitude • Reduced contribution to cumulative removal of land from other land uses • Contribution to cumulative removal of land similar to Mitigated Ivanpah 3	• No adverse impacts

Resource	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Noise and Vibration	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced duration of construction • Impacts likely to be similar to Modified I-15 • Impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced duration of construction • Impacts likely to be similar to Mitigated Ivanpah 3 • Impacts could be mitigated	• No adverse impacts
Public Health and Safety	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction • Impacts likely to be similar to Modified I-15 • Impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction • Impacts likely to be similar to Mitigated Ivanpah 3 • Impacts could be mitigated	• No adverse impacts
Socioeconomics and Environmental Justice	• No adverse impact • Beneficial impact on employment and fiscal resources	• Beneficial impacts would be lower than proposed project, but the same as Modified I-15	• Beneficial impacts would be lower than proposed project, but the same as Mitigated Ivanpah 3	• No adverse impacts • No beneficial impacts
Soil and Water Resources	• Potential adverse impact due to stormwater damage to facility • Potential impacts on groundwater use and quality could be mitigated	• Stormwater damage impacts would be much lower than proposed project due to reduced acreage and disturbance of active drainages • Stormwater impacts likely to be the same or higher than those in Modified I-15 • Groundwater use and quality impacts would be lower than proposed project, but the same as Modified I-15, and could be mitigated.	• Stormwater damage impacts likely lower than proposed project due to reduced acreage • Stormwater impacts likely to be the same or lower than those in Mitigated Ivanpah 3 • Groundwater use and quality impacts would be lower than proposed project, but the same as Mitigated Ivanpah 3, and could be mitigated.	• No adverse impacts

Resource	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Traffic and Transportation	• Direct and cumulative impact on I-15 traffic on Fridays • Unable to determine impact from potential glare distraction	• Impacts would be lower than proposed project, due to reduced duration of construction, and the same as Modified I-15 • Impacts during operations would be the same as the proposed project and Modified I-15 • Unable to determine impact from glare, but it would be lower than the proposed project and Modified I-15	• Impacts would be lower than proposed project, due to reduced duration of construction, and the same as Mitigated Ivanpah 3 • Impacts during operations would be the same as the proposed project and Mitigated Ivanpah 3 • Unable to determine impact from glare, but it could be higher than the proposed project and Mitigated Ivanpah 3 due to placement of heliostats adjacent to I-15	• No adverse impacts
Transmission Line Safety and Nuisance	• Potential impacts could be mitigated	• Impacts would be equal to the proposed project and Modified I-15, and could be mitigated	• Impacts would be equal to the proposed project and Mitigated Ivanpah 3, and could be mitigated	• No adverse impacts
Visual Resources	• Direct, adverse impact to sensitive viewing locations • Contributes to cumulative increase in industrial character of area	• Adverse impacts would occur, but would be lower than proposed project • Impacts to viewers on I-15 would be lower than Modified I-15	• Impacts to viewers in recreation areas to the west and north would be reduced from proposed project and Mitigated Ivanpah 3, but still adverse • Impacts to viewers on I-15 would be increased from proposed project and Mitigated Ivanpah 3	• No adverse impacts
Waste Management	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction, and the same as Modified I-15 • Impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction, and the same as Mitigated Ivanpah 3 • Impacts could be mitigated	• No adverse impacts

Resource	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Worker Safety and Fire Protection	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction, and the same as Modified I-15 • Impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction, and the same as Mitigated Ivanpah 3 • Impacts could be mitigated	• No adverse impacts
Geology, Paleontology, and Minerals	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction, and the same as Modified I-15 • Impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction, and the same as Mitigated Ivanpah 3 • Impacts could be mitigated	• No adverse impacts
Livestock Grazing	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction • Impacts would be in slightly different location than Modified I-15, but of the same magnitude • Impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction • Impacts would be in a slightly different location than Mitigated Ivanpah 3, but of the same magnitude • Impacts could be mitigated	• No adverse impacts
Wild Horses and Burros	• Potential impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction, and the same as Modified I-15 • Impacts could be mitigated	• Potential impacts would be lower than proposed project due to reduced acreage and duration of construction, and the same as Mitigated Ivanpah 3 • Impacts could be mitigated	• No adverse impacts

Resource	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Recreation	• Potential impacts to recreation access and Ivanpah Dry Lake bed could be mitigated • Would contribute to cumulative reduction of recreational experience by increasing industrial character of the area	• Potential impacts to recreation access and Ivanpah Dry Lake bed would be lower than proposed project due to reduced acreage and disturbance of active drainages • Contribution to cumulative reduction of recreational experience would be approximately equal to proposed project and Modified I-15	• Potential impacts to recreation access would be higher than proposed project and Mitigated Ivanpah 3 due to increased length of existing trails • Contribution to cumulative reduction of recreational experience would be approximately equal to proposed project and Mitigated Ivanpah 3	• No adverse impacts
Engineering Characteristics	• Potential impacts could be mitigated	• Would have higher level of land use efficiency than proposed project • Characteristics would be the same as Modified I-15	• Would have higher level of land use efficiency than proposed project • Characteristics would be the same as Mitigated Ivanpah 3	• No adverse impacts

9.0 Public Participation

Both the BLM's NEPA process and the Energy Commission's CEQA-equivalent process provide opportunities for public participation in the scoping of the environmental analysis. For the Energy Commission, this outreach program is primarily facilitated by the PAO. As part of the coordination of the environmental review process required under the Energy Commission/BLM California Desert District MOU, the agencies have jointly held public meetings and workshops which accomplish the public coordination objectives of both agencies. This is an ongoing process that to date has involved the following efforts.

Libraries

The AFC was sent to the main county libraries in San Bernardino, Barstow, Fresno, and Eureka; the main branches of the San Diego and San Francisco public libraries; the University Research Library at UCLA; the California State Library, and the Energy Commission's library in Sacramento.

Outreach Efforts

BLM solicited interested members of the public and agencies through the NEPA scoping process. BLM published a Notice of Intent to develop the EIS and amend the CDCA Plan in the Federal Register, Vol. 72, No. 214, page 62671, on November 6, 2007. The initial Public Scoping meeting was held on January 4, 2008, and coincided with the Informational Hearing held by the Energy Commission. On January 9, 2009, BLM published notice of an extension of the public scoping period, and an additional joint public scoping meeting was held on January 25, 2008.

Following the scoping period, the Energy Commission and BLM held additional joint Issue Resolution workshops which were announced and made available to the public. These workshops were held on June 23, 2008 in Primm, Nevada, and on July 31 and December 15, 2009 in Sacramento, California. The Energy Commission continued to accept and consider public comments, and granted petitions to intervene to eight interested groups including Defenders of Wildlife, Sierra Club, Basin and Range Watch, and Center for Biological Diversity (June 2, 2009), California Native Plant Society, Western Watersheds, CURE, and San Bernardino County. Although not officially part of BLM's NEPA process, BLM's NEPA analysis was supported by information received through these activities.

The BLM public participation process included soliciting comments regarding the scope of the analysis from other government agencies, the public, and non-governmental organizations.

The Notice of Availability of the DEIS was published on November 10, 2009; the 90-day public review and comment period ended on February 11, 2010. During the public comment period, a variety of activities occurred in which BLM received additional information regarding the proposed project and potential alternatives, impacts, and mitigation measures. These activities included:

- Receipt of comments from the public, and other local, state, and federal agencies during the public comment period;
- Public testimony by Energy Commission staff and consultants, BrightSource staff and consultants, and intervenors associated with the Energy Commission certification process for ISEGS;
- Workshops, involving BLM staff and consultants as well as the above groups, to consider and evaluate impact analyses and mitigation approaches; and
- Submittal of additional technical reports, project design information, impact analyses, and applicant-proposed mitigation measures by BrightSource.

The Notice of Availability of the SDEIS was published on April 16, 2010; the 45-day public review and comment period ended on June 1, 2010.

The applicant's Application for Certification to the Energy Commission (CH2M Hill 2007), the Energy Commission's PSA, and the joint BLM/Energy Commission FSA/DEIS are all publicly available on the Energy Commission website at http://www.energy.ca.gov/sitingcases/ivanpah/index.html.

Summary of DEIS Public Comments

BLM received comments on the DEIS from 37 individuals, groups, and agencies. These comments are summarized in Appendix A-1 of this FEIS. These include hundreds of comments received both in favor of the project, and in opposition to the project, in the form of mass mailings and e-mails. The summary in Appendix A-1 of those comments includes a description of how each comment was evaluated and responded to by BLM. Also, where a comment is particularly relevant to the text of the FEIS (either comments resulting in revision to the FEIS, or comments dissenting from important conclusions of the FEIS), that information has been incorporated into the FEIS.

For a full list of the DEIS comments and BLM's responses, see Appendix A-1. The items below provide a brief summary of the more substantial comments.

Alternatives

Many commenters raised objections to the number and range of alternatives considered in the DEIS. This included general objections to the limited number of alternatives, objections to the number of alternatives being limited by a narrow purpose and need statement, and opinions regarding other alternatives that should have retained for more detailed analysis. In response to these comments, BLM re-reviewed the rationale for eliminating all of the identified alternatives from detailed analysis, including specific analysis of each alternative against BLM's criteria for retaining alternatives in the BLM National Environmental Policy Act Handbook H-1790-1, Page 52.

As a result of this review, the following actions were taken:

- Two alternatives (the Reduced Acreage alternative and the I-15 Alternative) that had been eliminated from detailed evaluation were retained, and that additional analysis was presented in the Supplemental DEIS published in April, 2010.

- Two alternatives that had not been identified in the DEIS (Ivanpah Playa and Phased Approval) were added to the list of alternatives considered.
- The rationale for elimination for all other alternatives was reviewed, and the text describing the rationale revised to be consistent with the BLM NEPA Handbook.
- The introductory text of the alternatives analysis was modified to more accurately describe the difference between the initial alternatives identification and screening process, and the more detailed environmental evaluation of the retained alternatives.

Cumulative Impact Analysis

A variety of comments were received regarding the scope and methodology used for the cumulative impact analysis. This included specific comments regarding the relationship of the EITP project to the Ivanpah SEGS project, recommendations for other projects that needed to be considered, recommendations for additional quantitative analysis, and concerns regarding the format in which the analysis was presented. In response to these comments, the following modifications were made:

- Additional information regarding the EITP project, including project description information that was not available at the time of the DEIS, and environmental impact analysis information contained in the April 2010 EIR/EIS for the EITP project, was added in several locations in the FEIS. This included the proposed project description, the section on Transmission Line Safety and Nuisance, and the cumulative impacts analysis section. The FEIS indicates that the EITP is considered a cumulative action with respect to Ivanpah SEGS.
- The format in which the cumulative analysis was presented was modified. In the DEIS, the projects considered in the analysis were presented in a stand-alone Cumulative Scenario section, and the actual discussion and analysis was included within the impact analysis sections. As noted in may comments, this resulted in a lack of consistency in the projects considered, and in the level of analysis, among the technical sections. These issues were corrected by developing a single section that defines all of the projects considered up front, and then presents all of the technical analyses together.
- The level of quantitative analysis in the cumulative analysis was improved, primarily through the availability of new data since the publication of the DEIS. At the time of the DEIS, no environmental analysis documents existed for the EITP, the Silver State solar projects, the DesertXPress project, or the Southern Nevada Supplemental Airport project. Subsequent to the publication of the DEIS, much of this information became publicly available, and it has now been in corporate into the FEIS.

Impacts to Biological Resources

A primary focus of the comments on the DEIS regarded the sufficiency of analysis of biological resource impacts, and the scope of the alternatives and mitigation measures developed to address these impacts. The comments focused on the desert tortoise and rare plants, but also included comments on birds, insects, cryptobiotic crusts, bighorn sheep, gila monsters, burros, and other species. The comments ranged from a desire for BLM to consider alternatives that would protect biological resources on the project site indefinitely, a desire for more quantitative analysis of impacts, and objections to the range and sufficiency of proposed mitigation measures. In response to these comments, the following modifications were made in the FEIS:

- In an attempt to reduce the magnitude of the impact of the proposed project on desert tortoise and rare plants, BLM cooperated with the Energy Commission, the applicant, and the intervenors to develop and analyze two alternatives, the Mitigated Ivanpah 3 and Modified I-15 Alternatives, which were specifically intended to reduce impacts to tortoises and rare plants. The Mitigated Ivanpah 3 Alternative, which would reduce the magnitude of impacts to these resources, has been identified by BLM as the preferred alternative.
- BLM considered other comments related to evaluation of alternatives that would preclude future development of the project area, and concluded that these alternatives were outside of the scope of BLM's requirement to evaluate the proposed project.
- The format of the biological resources section was modified to more clearly define those species within the scope of BLM's analysis, and to reach an impact conclusion for each resource.
- Additional data and analyses were added, as needed to incorporate the newest information related to various species. This included addition of recent requirements for golden eagles, recent decisions reached by USFWS and CDFG regarding acceptable desert tortoise compensation, and addition of analysis related to the MBTA.

General Industrialization, and placement of Project in Currently Undeveloped Area

Many of the public comments, including those associated with alternatives, cumulative impacts, and biological resources above, generally opposed the project because it would develop a currently undeveloped property and could, through growth inducing impacts, contribute to a general industrialization of the Ivanpah Valley area. These impacts were identified and disclosed in the DEIS, SDEIS, and FEIS, including the reduction in habitat for sensitive species, the change of the visual character of the area from undeveloped to industrialized, and the impact of this change on land use and recreation in the area. These impacts were all considered in BLM's selection of a preferred alternative.

Additional Comments

Other substantial comments were received with respect to impacts to the Mojave National Preserve, to air traffic associated with the Southern Nevada Supplemental Airport, and to socioeconomic impacts to San Bernardino County. BLM considered these comments, and the following summarizes the results of BLM's review of these comments:

- With respect to impacts to the Mojave National Preserve, BLM reviewed the impact analyses in the DEIS to verify that they appropriately considered receptors associated with the Preserve. In some case, such as visual and biological resources, BLM concluded that the DEIS appropriately considered these receptors. In other cases, such as air quality and noise, BLM performed additional analysis of potential receptors in the Preserve. However, with respect to a request for a stand-alone section analyzing the Preserve, it was concluded that analysis of receptors within the Preserve was most appropriately performed in the technical sections.

- The County's comments regarding socioeconomic impacts, including impacts to County fire and emergency response services, contradicted information that was originally provided by the County during the DEIS process. In response, BLM sent a letter to the County requesting additional information. The County did not respond to that letter in time to incorporate a revision to the FEIS. However, the text of the FEIS was revised to include the new information from the County.
- The Clark County Department of Aviation's comments regarding the impact of the proposed project on the Southern Nevada Supplemental Airport were reviewed. In most cases, it was determined that the information requested in the comments was already present in the DEIS. However, BLM also responded by sending a letter to the FAA requesting additional information on their concerns, if any. FAA did not respond to that letter in time to incorporate a revision to the FEIS.

Summary of Supplemental DEIS Public Comments

BLM received comments on the Supplemental DEIS from 20 individuals, groups, and agencies. These comments are summarized in Appendix A-2 of this FEIS. These include hundreds of comments received both in favor of the project, and in opposition to the project, in the form of mass mailings and e-mails. The summary in Appendix A-2 of those comments includes a description of how each comment was evaluated and responded to by BLM. Also, where a comment is particularly relevant to the text of the FEIS (either comments resulting in revision to the FEIS, or comments dissenting from important conclusions of the FEIS), that information has been incorporated into the FEIS.

For a full list of the DEIS comments and BLM's responses, see Appendix A-1. The items below provide a brief summary of the more substantial comments.

Alternatives

The comments received on the SDEIS repeated many of the comments on the DEIS with respect to the limitations on the number of alternatives considered. Also, detailed comments were received providing rationale in favor and in opposition to both the Mitigated Ivanpah 3 and Modified I-15 Alternatives. No text or analysis changes were made in response to these comments. However, the information in the comments was considered in the selection of BLM's preferred alternative.

Cumulative Impact Analysis

The SDEIS did not include any revision of the cumulative impact analysis that had been provided in the DEIS, including cumulative analysis of the additional alternatives. Therefore, many of the comments on the SDEIS repeated earlier DEIS comments on the scope of the cumulative analysis. BLM addressed these comments through the revision of the format and scope of cumulative analysis, which is now included in Section 5 of the FEIS.

Biological Resources

Many comments were received on the value of the Mitigated Ivanpah 3 and Modified I-15 Alternatives in reducing impacts to biological receptors, specifically the desert tortoise and rare plants. These comments were considered, and additional information was presented in these analyses where applicable.

10.0 List of Preparers

10.1 Draft EIS Project Team

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Ramona O. Daniels	Outdoor Recreation Planner/Visual Resources
Kenneth G. Downing	Geologist/Soil and Water
Sarah C. Murray	Archaeologist
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Lawrence F. LaPre	Biologist
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Sandra McGinnis	Planning and Environmental Coordinator
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10.2 Supplemental and Final EIS Project Team

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